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PHYSICAL

A PART OF

THEOLOGICAL SCIENCE:

OR,

COGITATIONS OF A BIBLE READER,

ON THE SCRIPTURE HISTORY OF THE

CREATION OF THE EARTH;

AND ON THE GEOLOGICAL DESCRIPTIONS OF

SUBSEQUENT CHANGES THEREIN.

> *Through faith we understand that the worlds were framed by the word of God; so that things which are seen were not made of things which do appear.* Heb. xi. 3.

BIBLIOTHECA · BODLEIANA

BY

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"A CENTURY OF BANKING," &c.

1870.

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I. INTRODUCTION.

FIRST. ON REVELATION AND THEOLOGY.

1. GOD'S purpose in creating the earth was self-manifestation to and by a creature to be made in his own image: and this not only by word, audible and inaudible, but also by manifestation of his attributes in the works of his hands. Hence arises the science of Theology. Gen. i. 26.

2. Theology is discourse about God, His existence, His character, His purpose, His works. It is necessarily founded on revelations made by Him: for men cannot possibly know anything concerning God but in so far as He has Himself declared it. These revelations He has made in three different modes, of which it is good to have a distinct perception. Deut. xxix. 29; Job xi. 7.

When God created Man, He made Himself known to his soul, and afterwards revealed His will by personal communication, so that, from the first, Man had the knowledge of certain great fundamental truths. This impress of the truth has never been obliterated, though weakened by the Fall, and since that disastrous event requiring revival in order to be effective. This abiding primary manifestation of God to men may be called, for distinction's sake, Soul-revelations. Gen. i. 28–30; ii. 16, 17, 19.

When God made the heavens and the earth, He appointed that His works should testify to certain truths concerning Himself, and He so constituted Man that he should be able gradually to discern and understand this testimony. It could not be contrary to, or, in its essence, additional to the Soul-revelations He bestowed, but would form a continued illustration and confirmation of them, and thus, in some sense, an enlargement of them. This testimony in Nature may be called, Creation-revelations. Rom. i. 20.

When God separated Israel from the rest of men to be to Him a peculiar People, He saw it good to have the great leading revelations He had made committed to writing, and He was pleased to add thereto from time to time: entrusting the guardianship thereof to the People in covenant with Him. These written communications cannot be contradictory to the Soul-revelations or the Creation-revelations; nor additional to them in the sense of being entirely new, and having no connection with the others: they are supplementary to, and so the expansion of the former; they are the completion, and so the confirmation of them. These written communications may be called, Bible-revelations. Rom. iii. 2; 2 Tim. iii. 16.

3. Now, continuing this phraseology for the purpose of leading the mind to look at the truth from various points of view, we may speak of three different measures of Theology.

Soul-theology, or discourse about God, would be limited to that measure of knowledge about God's attributes and will given in Soul-revelations. Not that any man under ordinary circumstances ever possessed such only, for, whether aware of it or not, he has been enriched in knowledge through one or both of the other modes of revelation. Yet a man born deaf and blind could have very little more, and to him doubtless it would be made to be sufficient; and its importance to all will be felt when it is observed, that without this Soul-theology combined with our natural constitution, the other measures of Theology would be set before us in vain.

Creation-theology, or discourse about God, is limited to that measure of testimony to God, and his attributes and works, contained in Creation-revelations. Natural Theology has been understood to mean so much knowledge about God, as Man, by his unassisted reason, could attain to from observing natural objects and phenomena. But there has been no observer in a condition to qualify him to try the experiment, and ascertain how much a man's unenlightened reason could discern of the attributes of God in His works. Creation is indeed a witness to God, and a plain-spoken and faithful one; but it speaks to man's faith in God, and it would not by itself be sufficient to teach men. Even among men having a belief in Deity, it speaks clearly to those only who have an ear to hear; it shews its secrets to those only who have an eye to see. But who are they? Those who have an heart willing to understand, through the speaking of God to them in

Soul-revelations having taken effect. If men refuse to listen to that *still small voice* within them, if it has spoken to them in vain, Nature also will testify in vain, for her ministry is not adapted to such. To men in that hardened state, the preaching of the love of God to melt their hearts, if it may be so, or, the preaching of the Day of Judgment to break their hearts, if it may be so, is the appointed remedy, and the only ground of hope. It is to the believer who humbly listens to the Soul-revelations, to at least a small extent, that Creation-theology can be of service.

Bible-theology, or discourse about God, is in that extended measure which is to be found in Bible-revelations. This, like Creation-theology, is of no real value to those who neglect Soul-theology. It may entertain with variety of ideas the mind of him who, like a miser hoarding gold, covets learning for its own sake, and not for its use: but God has not made revelations about Himself and His purpose merely to exercise the powers of a man's intellect; and the benefit thereof will not be obtained by those who thus misuse them. Bible-theology will not be understood, or accepted, because the Bible-revelations will not be held with a firm faith, by him who has no Creation-theology, if such a man there be. This expression of doubt is used for the purpose of impressing the fact, that there is no man of moderate abilities, with even but a small share of education, who has not attained to some measure of Creation-theology, though he never learnt it in a formal manner. And the assurance of the existence of God, and of His active providence, thereby generated, very greatly facilitates the reception of truths that are, in their fulness, peculiar to Bible-theology.

Theology, then, in its fullest measure, as Christian Theology, is discourse about God, founded on all the revelations He has made—Soul-revelations, Creation-revelations, and Bible-revelations—these being all required to give light and extension, and confirmation one to another. It is true, indeed, the Bible-revelations contain in words all that has been declared in the other two modes, but without the internal experience arising from Soul-revelations, the words of the Bible would be at best but imperfectly understood; and without the outward experience obtained of the objects and phenomena of Nature, the declarations of the Bible would be less perfectly realised. And without these three modes of revelation men would be less advanced: these blessings being provided for him, because they are suitable to man's constitution and condition, and are, therefore, necessary for him.

SECOND. ON THE CREATION AND THE BIBLE.

Now it is necessary to say thus much concerning the three modes of revelation and their fruit, for the purpose of keeping the full matter before us, but it is of portions of the two latter we propose to speak particularly at the present time: setting forth their importance, not as isolated, each by itself, but as in connection with and thereby elucidating one another; and this for the purpose of proving that it is the duty of Bible Readers to be Creation Students also, in so far as their time and talents will permit. In justification of this view of the matter, and of the mode to be used in the subsequent illustrations of it, the following observations are offered for consideration.

Obs. 1st. The Creation and the Bible are two of the parts of one revelation of God, made by God to Man: because self-revelation, as stated before, both by deed and word, is God's purpose. Hence Man was made in the image of God, that by deeds and words he might bear witness to his Creator.

Creation is first in the order of time, and is addressed to man through his five senses, though chiefly through his eyes. Scripture is second in the order of time, and is addressed to Man through his ears: for, being written in the language of men, it is of course intended to be made vocal, and to affect the soul through the ear; as the notes of a piece of music in a book are meant to be sung, or played on an instrument that the ear may hear them.

The latter portion of revelation is not (as already remarked) opposed or in anything contradictory to, the former, but a continuation and thus a confirmation of it: Creation witnessing to the Being, Power, Wisdom, and Goodness of God; the Bible testifying to His Holiness, His Righteousness, and His Mercy also—declaring further His purpose in Man, and His promises to Man. The words used by the Apostle concerning another matter may be applied to the order of these portions of revelation—*Howbeit that was not first which is spiritual, but that which is natural; and afterwards that which is spiritual.* 1 Cor. xv. 46.

Creation and Scripture being revelations from one source, resemble one another.

—In terseness. How much science is there in one phenomenon of Nature; how much instruction is there in one sentence of Scripture.

—In connection of their parts. Each object, each phenomenon of Nature, is best known when studied with reference to the rest; each part of Scripture is best understood in the light of the whole: meagre philosophy and narrow-minded theology being the result of considering exclusively favourite portions of either revelation.

—In mutual elucidation. The observing of Nature is helped by what we learn from the Scriptures; the pondering of Scripture is furthered by familiarity with Nature: the study of both revelations being important for the right understanding of either.

—In arising out of God's purpose. The Student of Nature will be apt to run wild in his theoretical speculations, and the Bible Reader will be liable to wander far from the truth in his interpretations, unless God's purpose in Man be kept steadily in view.

The facts in Creation should always be kept in view as things of a different value from the inferences which we think ourselves to be justified in drawing from those facts. So, also, we should ever in our cogitations distinguish between that which is positively asserted in the Bible, and that which we accept as true, because it seems to be a fair conclusion from what is there stated.

What Nature declares we must admit, and therefore the Student of Nature should not deem it any advantage to be unguided and unshackled by the revelations of Scripture: for no word of God can be contrary to the testimony of his works. In like manner, what the Bible declares we must cleave to, and therefore we need not hesitate, through dread of evil results, about listening to any true discovery of the physical philosophers: for nothing can be found in the earth contrary thereto.

Till we ourselves are perfect, we shall not attain to a perfect comprehension either of the Creation or the Bible-revelations, and therefore there will be ever recurring such difficulties respecting God's acting, both in the region of natural and of spiritual things, as no theory of our framing will perfectly explain.

Obs. 2d. God has given revelations concerning Himself in the Creation and in the Bible, to the end that we may know HIM: not that we know merely the Creation or the Bible.

The scientific man who is a mere Student of Nature is apt to admire the objects and phenomena of Nature more than the God of Nature. The Christian man who is a mere Bible Reader is apt to admire the book more than the Author of it; and to ponder on the scheme of Redemption more than on the self-sacrifice of the Redeemer. Natural knowledge and Bible knowledge are alike worthless, unless they lead a man to know God more truly, and to love and fear Him more fully: so causing him to be filled with gratitude to his Creator, and to become vocal in His praise.

Obs. 3d. The Creation is a storehouse of Natural Objects, wonderful for their number, for their variety, and for their individual organization and peculiar properties. It is God's Museum, and into it He has admitted Man; not that he might listlessly saunter up and down therein, but that he may look, observe, consider, enquire, and gradually, by the accumulated labours of many generations, attain to an extensive acquaintance with the objects therein.

The Creation is the theatre of Natural Phenomena, marvellous in respect to the extent of their unceasing operations, the simplicity of their principles of action, and the vastness of their beneficent results. It is God's Workshop, and into it He has admitted Man, not to be an idle apprentice therein, indifferent to all that is going on around, and in the end uninstructed thereby, but that he—being fitted by bodily senses, and by mental faculties for observation and experiment—may watch, study, and discover something of the properties of matter, and of the physical and vital forces existing therein, which are together producing all the operations he sees; and, applying such knowledge to his own use, may, from the beneficial effects thereof, learn the more to understand and to admire those phenomena which he cannot imitate, and which are above his control.

Obs. 4th. The Sciences and Arts of men are, properly speaking, God's Sciences and Arts: being limited portions of His knowledge, and small imitations of His works. His having permitted and enabled men to attain, so far, to an acquaintance with, and to the useful application of these things, ought to make them grateful to Him: especially so when studying Nature, or making use of her powers.

Hence as God gives to men in Nature around them, so men, by their Sciences and their Arts, set before themselves an unceasing testimony to the Being, and to the Wisdom, Power, and Goodness of God. For the Sciences which men have laboured to frame are but an orderly statement of their knowledge of facts concerning the Creation; and the Arts which they have matured at so much cost are founded on the reality and constancy of these facts. Now, if the Universe was not the work of a wise God, and only a chaos—an accidental conglomeration of portions of matter—there could be no Science, there could be no Art. If then these are realities and not deceptions, they testify to the original action and the abiding operation of One who is not only mighty, but also wise and good.

So, then, the philosophers extending their Sciences, and manufacturers improving their Arts, and even those whose occupations preclude them from much personal acquaintance with Nature, and whose deficiences in mental culture hinder them from acquiring knowledge of Nature from books, are without excuse if they realize not, more or less, the great fundamental truths of which we are speaking. A man's own body being a little cosmos, an epitome of the world around, his acts in nourishing and cherishing his body, with the daily household operations necessary to that end, and the hourly experience in his labours, whatever trade or profession he may be engaged in—all these countless actions which he performs or sees performed, even in the most narrow sphere, are a sufficient testimony to the truth.

Obs. 5th. Our senses can perceive physical objects, with their qualities; and the operations in action among them, with their results: whence, as a consequence, we have words wherewith to speak of these things. We cannot see spiritual things and spiritual operations, and therefore have no simple language with which we can record or tell them. But, for this reason partly, God has caused to exist a certain dim resemblance between things visible and things invisible, so that the language properly descriptive of the former may be used as, to a certain extent, correct in reference to the latter: such language, while literally true as applied to physical things, being but figuratively true only in reference to spiritual things. From the beginning, God, in his revelations to men, has made use of Emblems, Symbols, Types, and Parables, as well as of plain discourse: having so constituted Man that he should be capable of receiving knowledge in this way, and of loving this mode of instruction—the things which they see and are familiar with being referred to as illustrative of that which as yet they see but as through a glass darkly, but concerning which God would not have them to be ignorant. For Symbolism is not an invention of clever men, but exists in visible things and phenomena, while it is men in whom the gift of imagination is well developed that will most readily detect the secret, and make use of it to their own and their neighbour's joy.

Hence it is that emblematic language and symbolic actions are the ornaments of human intercourse not only with one another, but also with God. And hence also is it that, in both cases, on occasions of special enthusiasm or spiritual excitement, the souls of men demand poetry, with suitable music, and corresponding bodily action, as being more ample means of uttering all their thoughts and all their feelings, than plain language and unimpassioned demeanour afford. It is of necessity, therefore, that this figurative use of things, words, and acts, should be employed in Church services, whether Godward or Manward: where this is not done, addressing the eye as well as the ear, there cannot but be an enormous passing by, if not an intentional denial of parts of God's truth.

Obs. 6th. The history of the Creation, and other Scriptures in which pointed reference is made to the objects and phenomena of Nature, being revelations from God, must be worthy of reverent study. But they cannot be fully understood, and therefore not duly appreciated, unless Bible Readers have some knowledge of Nature. Therefore, the Physical Sciences, being the sum of men's knowledge respecting it, ought to be studied, so far as his time, means, and abilities allow, by every Christian man. Not for amusement merely; not for gain merely; but also as a part of religious knowledge.

THIRD. PLAN OF THE WORK.

The truth stated in the last Observation is what we propose to illustrate at length in the following pages. The object being to shew the importance to a Christian of a knowledge of the Objects and of the Phenomena of Nature: first, that he may understand the value of the references thereto, so often occurring in Scripture; secondly, that he may see therein the confirmation of his faith in the Scripture revelation of the Attributes of God; and thirdly, that he may discern the testimony which the Sciences and Arts of men are bearing to the same facts.

The course selected for attempting to accomplish this important object, is to endeavour to frame such a commentary on the first two chapters of Genesis as shall draw attention to the following points in the order stated. This involves a good deal of repetition of certain formulæ of expression; but it is in this case unavoidable, the purpose being to impress the mind and the heart with the endless number of objects and occasions by which, and in which, the testimony to God is mutely staring them in the face, or clamorously insisting on being taken notice of. The plan of these expository cogitations is as follows.

First. A summary of comments on the words of the text to shew, in the light of the Scriptures generally, and of the

Physical Sciences, its plain or probable meaning: and this in answer to the ever recurring question, What does God intend that Christians should learn from these words?

Second. A note of the chief results of the creative act referred to in each text; and of the Sciences founded thereon.

Third. A gleaning of hints from the matter in hand respecting—1. The character of God; 2. The responsibilities of Man; and 3. The symbolism of the objects and phenomena of Nature.

FOURTH. A TABLE OF THE SCIENCES.

It may be useful to the reader to have supplied here a list of the principal Sciences, arranged in the order in which they seem to suggest themselves to our remembrance when reading the history of Creation, and in which order, therefore, they will be referred to after each commentary on a portion of Genesis i., ii.

CREATION OF MATTER: Which as consisting of particles, and as occupying space, reminds us of—

- Mathematics.
  - Laws of Number.
    - Arithmetic.
    - Logarithms.
    - Algebra, &c.
  - Laws of Space.
    - Geometry.
    - Trigonometry.
    - Conic Sections, &c.
- Mechanics, Elementary.
  - General Properties of Matter.
  - Laws of Motion.
- Mineralogy, Elementary.
  - Simple Substances.
  - Peculiar Properties.

FIRST DAY: creation of Light.

- Attraction.
  - Cohesion.
  - Chemical Affinity.
    - Chemistry.
  - Crystallization.
  - Gravitation.
- Light.
  - Photology.
  - Thermology.
  - Actinism.
  - Fourth Rays. (see p. 57.)
- Electricity.
  - Electricity.
  - Galvanism.
  - Magnetism.
  - Electro-Magnetism.
- Mineralogy, Advanced.
  - Compound Substances.
  - Peculiar Properties.

SECOND DAY: creation of the Firmament.
- Mechanical Action of Gases.
  - Pneumatics.
  - Aerodynamics.
    - Acoustics—Music.
- Mechanical Action of Fluids.
  - Hydrostatics.
  - Hydraulics.
- Meteorology.

THIRD DAY: creation of Sea, and Land, and Plants.
- Hydrography.
- Geology, Primitive.
  - N.B.—Geology modern, caused afterwards.
- Geography.
- Botany.
  - Anatomy of Plants.
  - Physiology of Plants.
  - Classification of Plants.

FOURTH DAY: creation of Sun, Moon, and Stars.
- Mechanical Action of Solids.
  - Six Mechanical Powers.
  - Machinery.
    - Astronomy.

FIFTH DAY: creation of Water and Air (Oviviporous) Animals.
- Zoology.
  - Radiata.
  - Mollusca.
  - Articulata.
  - Vertebrata.
    - Fishes.
    - Reptiles.
    - Birds.

SIXTH DAY: creation of Land (Placental) Animals.
- Zoology, continued.
  - Vertebrata, do.
    - Mammalia.
      - MAN.
- Anthropology.
  - Anatomy.
  - Physiology.
  - Economic Arts.
    - Mechanical.
    - Chemical.
  - Fine Arts.
    - Painting.
    - Sculpture.
    - Architecture.

- Psychology.
  - Logic.
  - Philology.
  - Æsthetics.
  - Sociology.
  - Ethnology.
  - Jurisprudence.
  - Political Economy.
  - International Law.
  - History.

- Pneumatology.
  - Religion.
    - Theology.
    - Ethics.
    - Bibliology.
      - Heathenism.
      - Judaism.
      - Christianity.
    - Christian Church.
      - Doctrine.
      - Discipline.
      - Worship.
- Kingdom of Heaven.

It will seem strange to some, or even sound irreverent, to introduce the names of Sciences and Arts into a commentary on a portion of Scripture. But is there not a sufficient cause? Thereby we are reminded that the facts announced in the text are the foundations of the Sciences, and consequently of the Arts also; and that therefore this should be gratefully acknowledged when the Scriptures mention the Objects or Phenomena of Nature. For though this is not a treatise on Creation or Natural Theology, it is an argument to show the propriety of Christian men being acquainted with Natural Science, that they may have those impulses of soul which are suitable to the possession of that knowledge.

Christians are called to be sons of God: shall they live in the midst of their Father's works and not examine them carefully? Shall they hold His book in their hand and not strive earnestly to understand it more and more? Christians, as one with Christ, are called to sit with Him on his throne, and assist in blessing the Creation: shall they live on the earth on which He will establish his kingdom, and not diligently seek to become acquainted with the different parts of it, and with the laws under which God has appointed them to exist? Forgetting that as the earth at the first was put under the dominion of Man, so at the end it shall be again, and that the Second Adam shall make it as Eden, the garden of the Lord: of whose kingdom of peace there shall be no end.

The tendency of the times in which we live makes the study of the sciences additionally important, if that be possible, to Christian men. Formerly those who troubled the Church by perplexing themselves and others with curious doubts, did so by means of metaphysical speculation. Now, in this day of the triumphs of Science, the enemy is trying to perplex with physical difficulties, and in opposition to the scientific with their unphilosophical conclusions, and the religious with their proposals to abandon the written word, the battle of the Evidences—as to the being of God, His character, His purpose, and the truth of His written revelation—must be fought with a well-balanced statement of Scripture declarations and physical facts.

FIFTH. LIST OF THE ACTS OF CREATION.

It may facilitate the grasping of what follows in detail, to see the main points therein previously stated—as the Bible Reader's facts concerning the course of Creation.

1. God, when He created the heaven and the earth, made them out of nothing.

—Whether this took place immediately, or long before the period of light, called the First Day, or not, is perhaps uncertain.

—The earth came into existence without form—that is, without describable form; and void—that is, having none of those organized creatures in it, for the support of which it was created.

—The globe comprised all the matter that is now in it, and it consisted of the same number and quantity of simple minerals (if what Mineralogists esteem simple minerals be really such) as at present.

2. He, towards causing the earth to become fit for His purpose of supporting Man, accomplished the work of the First Day.

—At morn, created light (whatever that in its fulness may be): separating it from the darkness.

—Ordained that light should shine for periods of twelve hours each, designated Day; and be succeeded by darkness for periods of twelve hours each, designated Night.

—Having proved his work—

—At eve, He praised and confirmed it.

3. He, in furtherance of his purpose, wrought the work of the Second Day.

—At morn, caused air to appear as we now have it, forming an atmosphere, or vapour sphere round the earth.

—Appointed it to absorb fresh water from the watery, earthy mass beneath, and to bear it up for the purpose of being poured back on the earth.

—Called the Firmament Heaven.

—Having proved his work—

—At eve, He changed it not.

4. He, in continuance of his purpose, wrought the work of the Third Day.

—At morn, caused earth and water to be separated: ordaining the water (doubtless Salt water, as we now have it,) to be gathered together in mass and form one ocean, which he designated Seas.

—Caused some of the earth to stand up out of the water and form dry land, which He designated Earth.

—Caused materials of the dry land to become organized bodies, quickened with life, and so forming Plants of every sort that live, or have existed.

—Having proved His work—

—At eve, He praised and confirmed Earth, Seas, and Plants.

5. He, in promotion of his purpose, wrought the work of the Fourth Day.

—At morn, constituted new light-bearers in the firmament, to divide the day from the night.

—And to be for signs, seasons, days and years.

—The greater light to rule the day.

—The lesser light to rule the night.

—The stars also (the planets probably).

—Having proved His work—

—At eve, He praised and confirmed Sun, Moon, and Planets.

6. He, in advancing his purpose, wrought the work of the Fifth Day.

—At morn, caused materials in, or under the water, to become organized bodies, quickened with life, and so forming Fish of every sort that live, or have existed.

—Caused also Fowls to appear, of every sort that live or have existed.

—Commanded Fish to multiply in the sea, and Fowl on the land.

—Having proved his work (which was probably the creation of all oviviporous animals)—

—At eve, He praised and confirmed Fish, and Fowl.

7. He, in conclusion of his purpose, wrought the work of the Sixth Day.

—At morn, caused materials of the dry land to become organized bodies, quickened with life, and so forming land animals of every sort, save man, that are or have been.

—Fashioned out of the dust of the earth an organized body, breathed into its nostrils the breath of life, and Man became a living soul.

—Planted a garden in Eden, and placed therein the man He had made.

—Appointed him, as all other animals, herbs and fruits only for food.

—Excepted from Adam's use the fruit of the tree in the midst of the garden.

—Gave him dominion over all living creatures, and bid him, in token thereof, to give them names.

—Caused Adam to sleep, took one of his ribs, and made thereof a woman: bringing her to Adam as a special gift from the Lord.

—Having proved his work (which was probably the creation of all placental animals)—

—At eve, blest Adam and Eve, commanding them to replenish the earth, and subdue it;

—Praised and confirmed also the other land animals;

—In conclusion, re-praised and re-confirmed all the work of the Six Days.

8. He, having fully removed from the earth the imperfection of being without form and void, and of having darkness upon it, rested on the Seventh Day.

—At morn, sanctified the Seventh Day.

—Commanded Man to keep each seventh day holy, as a day of rest, because on that day the Creator entered into the enjoyment of his finished works.

II. CREATION OF MATTER.

FIRST. A SUMMARY OF COMMENTS ON GEN. I. 1, 2.

Gen. i. 1. *In the beginning God created the heaven and the earth.*

These are the first words of the revelation that was given to us in writing concerning the Creation: the substance of which had been, doubtless, made known to Adam by personal communication, and from him transmitted by word of mouth from one generation to another, and so originating those more or less corrupted traditions which have floated among all nations, as to the origin of visible things.

It has been conjectured, with much plausibility, that the course of acts producing the Creation was revealed to Moses in a series of visions, in the manner in which the Apocalypse was given to St. John—the brief, positive language being very like the abrupt and concise words of a Prophet declaring what in the Spirit he sees and hears—the acts in a vision being to him as the light of a day, the pause between the visions as the darkness of a night.

However given, this revelation was recorded by the inspiration of God, in confirmation of the previous knowledge bestowed on Adam to teach certain facts respecting the course of creation that never can be learnt from the study of Nature. It was not given to Moses to enable him to describe Creation minutely—just as Daniel, in chapters ii., vii., and viii., narrates not the future history of the nations so fully as profane history records it; and as Isaiah, in chapters lii. and liii., foretells not the events of Christ's life with the minuteness with which the Evangelists relate them—yet, as with respect to the latter revelations, so with respect to the former one, it is the duty of men to accept as true what it positively asserts.

Whether this verse, along with the next, should be read in connection with the third, as containing a part of the history of the First Day, or should be looked on as containing a declaration concerning God's act before that day, the learned are not agreed; but as the tendency of modern criticism is to support the latter opinion, it is here adopted: seeing that it does not apparently involve any spiritual error.

In this light, these words of ver. 1 are a summary of, used as an introduction to, the history which immediately follows, and is prefixed to it, to establish us in that fundamental truth without which we cannot understand aright what is here recorded. *Through faith we understand that the worlds were framed by the word of God, so that things which are seen were not made of things which do appear*, Heb. xi. 3.

In the beginning. This does not mean when God began to be, for with respect to Him the term has no application; nor does it mean when any creature that is in the third heavens, where God dwelleth, began to be; but "the generation of" the physical things with which men have to do: the revelation here made to men being in reference to those things only around and above them with which they are by creation connected, and with which they can, by their natural faculties, become acquainted.

God created. The record of the creation having been written for a people in covenant with God, and not for others, no explanation is offered as to who God is. The learned are divided in their judgments as to the real value of the three Hebrew words translated in our version by the words, *created, made, formed.* Some assert that they meant different sorts of acts, and are used with discrimination in the original; others maintain that the three words are in themselves equivalent, and are in Scripture constantly interchanged. But it is plain that the act of God here recorded means, creation out of nothing: it being "the generation of" the things referred to, and not an act of restoration, reconstruction, revival of that which had been before. Gen. ii. 4.

The heaven and the earth. The heaven, in the largest sense, includes all that can be seen by men from the earth. When the firmament or atmosphere was made, it was designated heaven, and at later periods of the Bible history, the atmospheric phenomena are said to take place in the heaven; but as the starry region appears to be the background or canopy of the atmosphere, it is often included in the term. Yet the declaration, in the day when it was made, was probably intended to apply particularly to those bodies in the heavens which most concern the earth, and make the greatest impression on men, namely the orbs of the Solar System; among which, though the earth is not the chiefest, it is specially named, because it is the history of it, as the destined inheritance of man, that is to be here revealed.

V. 2. *And the earth was without form and void; and darkness was upon the face of the deep. And the Spirit of God moved upon the face of the waters.*

This is the commencement of the separate history of the earth, after the declaration of its creation conjunctly with the other orbs of the Solar System.

And the earth. What is said implies that it existed in substance before it was put into such order as to fulfil the purpose for which it was chiefly designed. In substance, means, consisting of the same particles of Matter—the same sort and the same quantity of simple substances—as now. There is no reason to suppose that there has been any creation of matter in the earth, or any annihilation of it, since this globe was first formed; although many compound substances, none of which probably existed, at the first, have been formed through the operation of the physical powers, and powers of life—as they are being continually decomposed and recompounded—the simple minerals remaining unchanged and undestroyed.

Was without form. This is sometimes translated *invisible*, not in reference to absence of light, but to absence of definite shape that could be described, there being no arrangement of parts.

As yet the physical forces which produce precise forms, and pleasing arrangements of inorganic matter, were uncreated or undeveloped. Matter cannot exist without occupying space, and therefore must in reality have shape of some sort, but yet it may be shapeless in the sense of language being incapable of expressing what it is. Similar to which difficulty was that of Eliphaz to describe the spirit which appeared to him. Job iv. 16.

And void. This is sometimes translated *unfurnished*, meaning, unadorned and untenanted.

—As yet the powers of life to produce the decoration of plants and the tenancy of animals, headed up in man, were uncreated or undeveloped.

And darkness was. Probably more than mere absence of light is pointed at. God said to Job, *Where is the way where light dwelleth? and as for darkness, where is the place thereof?* Job xxxviii. 19. And he said by Isaiah, *I form the light, and create darkness: I make peace, and create evil: I the Lord do all these things*, Isa. xlv. 7.

On the face of the deep. Deep here does not necessarily mean either deep sea or a deep vacant hole, but is probably used indefinitely, like hades for the unknown place of departed spirits, to express the darkness and depth of the confused condition of the substance of the earth with which we seem to be familiar when we call it chaos.

And the Spirit of God moved. Lit. Trans. *And-Spirit of God was-brooding.* As a bird sits on her eggs to quicken them with life, and thus to cause them to become gradually a brood of young ones, so the Spirit brooded on the dead materials of the earth to prepare them for the word about to be spoken to them, and, as if endowed with life, to burst into the activity of obedience.

On the face of the waters. That which is here called *waters* is, apparently, the same mass of chaos which above is called *the deep.* It does not seem to be likely that there should have been waters or seas in the subsequent meaning of these terms.

It is commonly supposed that the Jewish mode of reckoning the day from sunset to sunset was that which had prevailed from the beginning of the human race, and that the sixth day's evening, as we should now account it, was, in truth, the commencement of the Sabbath. If so, it seems probable that the condition of the earth, described in this second verse, and the period during which the Spirit of God moved on the face of the waters, is to be accounted the evening that was the beginning of the first day: the first period of activity in working out the preparation of the earth for Man, the ordained representative of God.

SECOND. A NOTE OF THE CHIEF RESULTS OF THE CREATIVE ACTS OF GEN. I. 1, 2; AND OF THE SCIENCES FOUNDED THEREON.

Created the heaven and the earth (at present thinking of the latter as a mere chaotic mass) are words implying much, but we are so familiar with them that we are apt to read them, and to use them in conversation, without, at the moment, having a clear impression of this on the mind, or a sufficient emotion from it in the heart. For general expressions to have their proper effect, the particulars they comprise must be well known and sufficiently understood. It is worth while, therefore, to consider how much is involved in the above declaration.

In these two verses three of the things done by God seem to be more especially prominent—

—1. The appointment of the Laws of Number and of Space.

—2. The creation of Matter endowed with certain general properties.

—3. The making the Matter of which the earth, at least, consists, to be of several sorts, called Simple Substances.

Let us review these important facts, and at the same time enquire how much man has served himself of them. As atoms of matter could not, apparently, have been used till the physical forces formed them into gases, liquids, or solids, it may seem as if the consideration of their services should have been deferred till the next chapter. But it is an object to point out how early those qualities of which men avail themselves were brought into existence.

1. The Laws of Number and of Space: and the Sciences founded thereon. Number and Space are not dwelt on here in connection with the creation of the Solar System, on an assumption that they were then ordained by God for the first time, but because they were then brought into exhibition in the region which should be under the observation of Man.

The Law of Number. The things brought into existence even at that early point of the creation testified to numbers, and would have suggested them to an observer, if such there had been. First the Stars,—called in Scripture the heavenly hosts, or armies, both from their number, and from their being marshalled in order like a well-regulated army—would have pressed on the attention and suggested numeration. (Gen. ii. 1, xv. 5, xxii. 17.) These to the length of 5000 may be counted with the naked eye, and though by the assistance of the telescope this number has been extended to 70,000, yet recourse must be at length had to computation, by ascertaining or guessing how many may be in a small portion of the sky, and thence deducing the total number. In like manner the number of the simple substances created would have been counted by the supposed observer, but when he knew that each consisted of ultimate atoms smaller than can be ascertained, and would reckon their number, he would be driven to computation as an approximate to the countless number of the atoms of all matter. (Gen. xiii. 16.) Now, these approximations, by computation, can be effected, and supply us with knowledge far beyond what the eye alone can procure us, only because of certain fixed invariable facts ordained of God, and which are called the Law of Numbers.

The Law of Space. Space expresses a compound idea, comprising length, and breadth, and depth, even when speaking of it in general terms, to which is to be added figure or form when considering any particular portion thereof.

Space in general. This is a fact difficult for the mind to realize, though space limited we are familiar with, and to a certain degree understand the nature of; for Space does not consist of the things which occupy it, but merely affords them room for existence, and it exists, or may exist where there is nothing occupying it: like the sea, which is not constituted by the presence of the fish which live in it, but would still be sea, as truly as ever, though no fish were therein. When we look up at the sky by day, or by night when the stars are bright, we are made to feel how vast is the space before us, and yet this is but a portion of space. When we calculate the extent of the space we can see, the resulting figures assist us a little to comprehend that it is immense: but only a little, for we soon have before us numbers which, though we can name them and perform, according to the Law of Numbers, various computations with them, are so great that the mind fails to realize what they imply. The Sun is distant from us 95,000,000 of miles, but the nearest fixed Star is 200,000 times further off! Who can comprehend it? It is sometimes said the time occupied by light in travelling from these distant luminaries may assist our limited faculties. Light moves at the rate of 200,000 miles in a second (or eight times round the earth in that time), yet it requires 8 minutes—480 seconds—to come from the Sun, and three years, at least, from the nearest Fixed Star. Now, it must be remembered that space, with stars therein, exists all around us, and not in one direction merely, and therefore that the nearest Fixed Stars on opposite sides of us, are separated by a distance requiring six years at least for light to travel from one to the other.

Yet Space is not without limits, else it would partake of the attribute of deity: but God alone is incomprehensible, that is, without bounds.

Portions of Space. They have of necessity figure, if they be superficial merely, that is, conceived of as having length and breadth only, without depth; or, form, if comprising three dimensions. If lines be imagined to join together three or more stars that are in one plain they form a figure, or if lines join four or more stars not in one plain they would sketch out a form, and such figure or form can be imitated on paper, and various useful proportions between the different parts, and between the parts and the whole, of such figure, or form, are found invariably to exist. These relations are called the Law of Space.

The knowledge of these Laws of Number and Space, which men have attained to, and their modes of applying it to practical purposes, they have framed into the science of —Mathematics: of which the chief branches are—

—As to Number;	—As to Space;
—Arithmetic,	—Geometry,
—Logariths,	—Trigonometry,
—Algebra, &c. &c.	—Conic Sections, &c. &c.

These names, and many others that, for brevity sake, are omitted, refer to a vast amount of knowledge which has been accumulated, during many ages, from the researches and meditations of the greatest reasoners among men: that is, of men whom God endowed with talents to enable them to observe truly the facts concerning the world He created, and to draw useful conclusions therefrom. Even if to some readers the titles of these sciences, and those which are afterwards to be given, are more or less unintelligible, it is not without use that they should be stated, as tending to impress the fact that the knowledge which mathematicians have attained to is great and varied, and their skill in applying it to useful purposes very wonderful; and to stir up the hope of that fuller knowledge which shall be common when we are companions of the Man who is the perfect Mathematician.

2. Matter as endowed with certain general properties: and the Sciences founded thereon.

All the objects of Nature are formed of one or more substances, to all sorts of which collectively the term Matter has been assigned. What this matter is in itself we know not, but this the experience of our senses has taught us, that it consists of atoms infinitely small, and invested with certain properties, unchangeable and indestructible. These, because known to be inherent in all varieties of matter, are called the General Properties of Matter, in distinction from other qualities, which, being found to be distributed among different portions of matter, are said to be the peculiar properties of such portions respectively. The General Properties, existing in every object of Nature, are at least four in number, as follows:

—Impenetrability: an exclusive occupation of space, so that where one portion of matter is another cannot be also.

—Extension: possessing length, breadth, and thickness, with consequent outward form.

—Divisibility: capacity of endless division, so far as man's sense can judge, owing to its consisting of atoms smaller than man can measure.

—Inertia: inability to move itself, and therefore requiring outward force to effect this.

There are four other properties found in substances as they now are, namely, Porosity, Compressibility, Elasticity, and Expansibility: but, as these are probably the effects of the physical forces now operating on the atoms of matter, it is doubtful whether they should be reckoned among the properties of Matter.

These general properties of Matter are not only consistent with one another, but also with those peculiar to different portions of it. They are not trifling characteristics of Matter, but properties of the most indispensable importance: for none of the objects or the phenomena of nature could be what they are without them.

The knowledge of the General Properties of Matter to which men have attained, forms the Science of—
—Mechanics, Elementary: of which the branches are,
—General Properties of Matter.
—Laws of Motion: or, Statics and Dynamics.
Through acquaintance with the Properties of Matter, the Laws of Motion can be ascertained: these two sets of facts forming the elements of Mechanical Philosophy. As the objects and phenomena of Nature could not be what they are save for these General Properties of Matter, so likewise Man's science, and the arts thereby established, could not be what they are save through a knowledge of these properties.

3. Matter as comprising (in the earth at least) several sorts, called simple substances: and the sciences founded thereon.

There is a high degree of probability in the opinion that God did not, at the first, create any compound substances, but merely elementary or simple substances. These are at present supposed to amount to sixty-five or upwards, but more than the half of these occur only in small quantities, and their use in nature does not yet appear: possibly some of them will prove to be compound bodies.

These simple minerals, whatever may really be their number, have peculiar properties, each having its own, in addition to the General Properties just spoken of as common to all. These properties are of such a nature as not only to distinguish each mineral, and make it useful while it remains simple, but also to enable two or more of them to combine under certain circumstances, and form compound substances, of which we have to take notice in the next Chapter. The Bible Reader, without some knowledge of these simple substances of which the globe has been from the first composed, will have but a mean idea of the earth in that condition, *without form and void*, in which it was created. Chaos, probably to most minds, suggests the idea of a watery, muddy, disagreeable mass of useless refuse, instead of a store-house of all the materials requisite for the formation of the earth as it now is, with all the creatures on its surface; and as it shall be in the age to come, with all its then inhabitants. The assumption of some that the whole materials of the globe were originally fused into one mass, which, when it cooled, caused the earth's crust to be "a scoriaceous integument," is a very unlikely one.

The knowledge of Simple Minerals (to which alone reference is now made) that men have gained, form the foundation of the science of Mineralogy; in which these substances have been arranged into classes: some of the more important minerals (either for their immense quantity in the earth, or for their utility to man) being here mentioned by way of illustration.
—Mineralogy, Elementary: of which the chief branches are—
  —Simple Substances, 65;
  —Peculiar Properties;
  —Classification of Simple Substances.
    —Gases 5: Oxygen, Hydrogen, Nitrogen, Chlorine, and Fluorine.
    —Non-metallic substances 7: Sulphur, Phosphorus, Carbon, &c.
    —Metallic bases of Alkalies 3: Potassium, Sodium, Lithium.
    —Metallic base of Alkaline Earths 4: Calcium, Magnesium, &c.
    —Metallic base of the Earths 6: Aluminum, Silicium, &c.
    —Metals 40: Gold, Silver, Copper, Iron, Tin, Lead, Zinc, Manganese, Arsenic, Mercury, Platinum.

As in the operations of Nature so in the economic arts, the use of only the half of Simple Substances has as yet been discovered. Those that exist in the greatest quantities in the earth are the following—Oxygen, constituting $\frac{1}{5}$ of the air, $\frac{8}{9}$ of water, and $\frac{1}{2}$ of the most abundant earths and rocks, amounts most probably to one-half of the globe. Silica (in the form of flint, and the chief part of hard, sharp stones), constitutes probably $\frac{1}{2}$ of the solid materials of the earth. Aluminum (in the form of clay), and Calcium (in the form of lime), each $\frac{1}{10}$; and Potass, Soda, and Iron, each more or less than $\frac{1}{20}$ of the solid materials of the earth.

THIRD. A GLEANING OF HINTS FROM GEN. I. 1, 2, RESPECTING— 1. THE CHARACTER OF GOD; 2. THE RESPONSIBILITIES OF MAN; 3. THE SYMBOLISM OF THE OBJECTS AND PHENOMENA OF NATURE.

1. Hints respecting the character of God.

God. It is said *God created*, without any explanation of who He is, or any statement of His attributes. For this being an announcement from God to men, as headed up in Israel, He simply declares what He has done, but gives no account of Himself: because all men, though covenanted men especially, are bound to know who He is, they being descended from Adam, to whom God revealed Himself, and upon whose heart He made such an impress of the great truth, which it is of vital importance for all men to believe, that it was not obliterated though weakened by the Fall, but remains to this day on the natural conscience of men in all Nations. For no Nation has been discovered that does not feel there is One, at least, greater than men, and whom therefore it is wise to propitiate with sacrifices or gifts. This sense of fear respecting One unseen, even in its most degraded phase, when reverence forms no part of it, witnesses to the original knowledge of the existence of God. To men, therefore, it ought to be, and it is, even among those in whom the light of the truth has grown dim, to an extent beyond what Missionaries commonly believe, sufficient to say, as a first word, remember that God created the Heavens and the Earth. That this is not unreasonable, and that there is this impress on man's conscience, and that he is able to learn something of God from the visible creation, is plain from the subject of Paul's first address to the Athenians. For he, being accomplished in the learning of his day, a chief point in which was to know how to deal with men's understandings to the end of exercising influence over them, would not have trusted to an appeal to this conscious sense of God, if it had not existed even in these idolaters. *God that made the world and all things therein*, &c.: Acts xvii. 24–28.

God is self-existent: whatever exists yet is not so, is a part of Creation. Prov. viii. 22–30.

Three Persons, one God. Through the fuller revelation given to us Christians, we are enabled to discern, in the first words of the written word, more than Moses and the rest of Israel could do, namely, that the doctrine of the Trinity, so far at least as the pointing to a plurality of persons in the Godhead tends to this, was already hinted at. God, and the Spirit of God, are spoken of in evident distinction, while the word God itself, it is worth while to note, suggests an enquiry into the matter, it being plural, in a language in which nouns have three numbers, namely, Singular, Dual, and Plural.

Attributes of God. The discoveries of the Student of Nature confirm what the Bible Reader finds declared, and what even the natural conscience of Man assents to, namely, that—
—Omniscient Wisdom, seeing the end from the beginning, planned the whole and its several parts.
—Almighty Power commanded them to appear, and they came, and abide as He appointed them.
—Unspeakable Goodness ensured that all nature should be fitted for Man, and Man for nature.

God is Creator: or, the Creator is God. As doubtless the first Soul-revelation to Adam testified to God's being Creator (in the fullest meaning of the term), and to Man's being but a creature, so the first word of God's written revelation to man is, that He is Creator, and therefore at once by necessary inference, and soon after in actual word, that Man is a creature.

God is sustainer. He alone who created can uphold; He alone can destroy and renew his work. He alone therefore ought to be trusted in; He alone feared. Ps. civ.

God's greatness and Man's finiteness. The two facts are well brought out by the contrast in Gen. i. God self-existent before the heaven and the earth were; Man made by Him as the last of his works. Man cannot even form an idea of such a condition as the heavens and the earth not existing. It was natural, though incorrect, for the old heathen philosophers to say, Either Matter is eternal, or the Deity is not so.

Wisdom was Creator. He wrought all his work according to a plan God had devised: effecting each portion because of a sufficient reason; ordaining nothing from the caprice of fancy; doing nothing merely because He had a right to act as He chose. Therefore Creation, in all its parts, and as a complete whole, could not have been less than perfect with respect to the object then in view. If, as it respects this globe, it has been altered, it must have been done to make it suit better the altered circumstances of the tenant to whom it was committed. *The Lord by wisdom hath founded the earth; by understanding hath he established the heavens.* Prov. iii. 19. He regulated or limited his proceedings according to some unrevealed principles of wisdom, the result of which was the Law of Number and Space. *He telleth the number of the stars; he calleth them all by their names.* Ps. cxlvii. 4. *Where wast thou when I laid the foundations of the earth? Who hath laid the measures thereof, or who hath stretched the line upon it?* Job xxxviii. 4, 5.

2. Hints respecting the responsibilities of men.

Man but a creature. The first responsibility that a man should, and must feel, on studying this text in the light of those branches of science with which it seems to be specially connected, is that which previous Soul-revelations will have prepared him for, namely, to realize the fact that he is a creature: unable to create the least portion of matter, still less able to organize a plant or an animal, though qualified of God to make large use of the works of His hands. Men should do this readily and thankfully, as discerning that it is not degradation but honour, not oppression but blessedness, to be a creature dependent on such a Creator.

Man must be taught by God. Man, having been made after the creation of the heaven and the earth, and the things that are in the latter, all save himself, could know nothing of the origin of the earth, still less of the course of acts whereby it was made, except as it was revealed to him by the Creator. Adam knew whence Eve was, though he was in a deep sleep while she was being separated from his side, but it was because God gave him the faith of it. So men now must learn about the Creation from one or all of God's three measures of revelation; and, when they have done so, they are responsible for acknowledging their Teacher, and for using his knowledge lawfully.

Man should worship God as Creator. The Bible Reader and the Student of Nature are alike responsible for doing this. In the Psalms of David He is as much praised for the acts of creation as for the deliverance out of Egypt, although that was to Israel His great act, and the night of the exode declared to be the beginning of days to them. So should we praise Him for our creation and preservation, as well as for our redemption: doing this, because He has enabled us to learn more of his sciences, with far greater intelligence than Israel could exercise. 1 Cor. xiv. 15.

God only should be worshipped. Idolatry is absurd, man's reason being judge, even in the heathen: how much more foolish and wicked in Christian men, especially now when it is alleged that science makes it an enlightened age. We are responsible for offering the worship of our warmest love and highest esteem to God, and not to men or things: not to men, whether heroes in heaven or heroes on earth, or successful speculators, or distinguished politicians, or eminent churchmen; not to things, whether the production of Nature, as gold and silver, or the productions of man's skill by means of the fine or the useful arts.

Nature, seen or referred to, should stimulate gratitude to God. Because there is a Law of Number, a Law of Space, Matter, and Simple Substances, men are hourly reaping the benefits of Nature, and have framed the sciences of Mathematics, Mechanics elementary, and Mineralogy elementary. Therefore, whenever they look on Nature, or meet with references to its objects and phenomena in the Bible, they are responsible for acknowledging the Wisdom, Power, and Goodness of God, and of bowing the head to worship.

All things of God: He always to be praised. It is not of necessity nor by accident, it is not of self-constitution, nor by the contrivance of man, but solely by the appointment of God, that the following and many other like things are true.
—1. As to Numbers. That the four fundamental processes of Arithmetic—Addition, Subtraction, Multiplication, and Division—always produce the same results when the factors are the same, and always different results when the factors are varied; and that the rules framed for using these processes in various ways for the solution of endless questions, are always found to produce right answers.
—2. As to Space. That there are straight lines of different lengths, and curved lines of different bias; and that there are distinct figures and forms to which permanent names may be given, as Circle, Ellipse, Triangle, Square, Globe, Cone, Cube, &c. That in Circles the radii are all equal, and the curviture of the circumference is uniform in all its parts. That in triangles of every variety the three angles are always equal to two right angles, and that the sides have to one another the same proportion that their opposite angles have; while, in addition, the longest side of a right-angled triangle is always equal to the squares of the other two, though this is not true with respect to any other triangle. That in superficies of similar form, but unequal sizes, the contents are to one another in the proportion of the square of similar sides; and in solids of similar shape, but of unequal sizes, the contents are to one another in the proportion of the cubes of similar lines. That in Cones the sections are, when cut through the two sides

parallel to the base, a Circle; when not parallel, an Ellipse; cut through the base parallel to a side, a Parabola; but when not parallel, a Hyperbola—these four curved figures possessing important qualities very different the one set from the others. That the endless conclusions of Geometry respecting the lines and angles that bound figures, and the superficies thereby enclosed; and respecting the planes that bound forms, and the solids therein contained—all founded on a few self-evident axioms and postulates—are facts of trustworthy unchangeableness in all our theoretical speculations and practical operations.

—3. As to Matter. That it consists of atoms infinitely small, yet indestructible by man; that it possesses general properties, such as, that two portions of matter cannot occupy the same section of space at the same moment; that from its properties can be deduced the Laws of Force, such as, that action and reaction are always equal and in opposite directions; and so of a great many other facts of great practical importance.

—And 4. As to Simple Substances. That matter comprises 65 varieties, having peculiar properties; and that each sort is useful by itself for special purposes because of its own qualities, while capable of fulfilling the purpose of matter in general—thus enabling a greater number of objects to be accomplished: exclusive of those effected by compound substances having other properties, which fall to be noticed in the next chapter.

Now, that measure of knowledge of what God has ordained, which is included in the sciences of Mathematics, Mechanics, and Mineralogy, or even the lesser measures thereof, which unlearned men attain to by common sense and experience, is of daily use to society in common, and to every one of us according to our acquirements: clergymen, scientific and literary men, merchants, manufacturers, mechanics, farmers, and labourers, are all, in their several occupations, more or less indebted to the physical truths set forth in these branches of science, for being able to accomplish what they wish; and even women, in their domestic matters, as also their children, whether at school or at their amusements, are, though they know it not, taking advantage of these several appointments of God. For as Nature itself, as stated above, could not be what it is, save for the Law of Number and the Law of Space, and for the existence of Matter with its general properties, and of Simple Substances with their peculiar properties, so none of the sciences with the arts founded on them could be what they are save for the same. Surely, then, all classes of society—men, women, and children—are responsible to God for discerning, according to their ages, talents, and opportunities of obtaining knowledge, from whence is derived their ability to make large or small calculations, to measure land or cut cloth into fitting shapes for garments, to contrive complex or simple mechanical appliances, or to obtain the furtherance of their objects by the use of such simple substances as possess qualities suitable to that end; and, as a reasonable consequence, to thank Him for the privilege of thus applying His sciences.

Right use of Nature. If God, who is good, permits men to serve themselves of the objects and powers of Nature, surely He will hold them responsible for using these things lawfully: that is, in no other way than He, the Author of them, can approve.

Material things in God's service. To whatever extent the fulfilment of the Church's duty—whether Godward or Manward—can be promoted by all or any of the physical facts here considered, the rulers of his people are surely responsible for these being wisely applied in the spirit of promoting His purpose by the right use of that which is his own.

Men must heed their own testimony. The sciences of Mathematics, Mechanics, and Mineralogy, with the arts founded thereon, form a testimony that men have raised before themselves, though unintentionally, to the Being, Wisdom, Power, and Goodness of God.

3. Hints respecting the symbolism of the objects and phenomena of Nature.

Symbolism is the knowledge of that ordained fitness which exists in physical things to suggest truths respecting spiritual things.

The object in this Section of each Chapter will be to note, as far as known, the symbolic meaning of natural things; and to record, for consideration, cogitations respecting others, as they are suggested by successive verses.

The Heaven. Four words of different significations are used in the Old Testament for the heavens. 1. Firmament, or solid expanse: from "to beat out" (as metal), expressive of the idea of the arch overhead being a fixed strong vault (Gen. i. 6, 14; Isa. xlii. 5); and hence corresponding phrases are connected with it, such as the foundations or pillars of heaven (2 Sam. xxii. 8; Job xxvi. 11), and the windows or doors of heaven (Gen. vii. 11; Ps. lxxviii. 23.) 2. Heaven: from "to be high" or "heaved up," in contrast with the earth, from "to be low," whence heaven and earth, or the high and the low, were used to signify all things, because the Hebrew language had no term for universe (Gen. i. 1). 3. Heights, as a mountain (Ps. xviii. 16; cii. 19): meaning a suitable position for God's palace to stand on. 4. Expanses: applied to lower sky or clouds (Deut. xxxiii. 26; Ps. xviii. 12).

Because the heavens, where fowls fly (Dan. iv. 12), and higher still, where the stars shine (Gen. xxii. 17), are over our heads, and seem exalted greatly above us, the word comes naturally to be used symbolically for the place where God with his Angels dwell (Ps. ii. 4). So also in the New Testament (where the word heaven seems to be derived from "excellencies," *i.e.*, among the things that we can see), it is used for the place where God dwells, and where the spirits of the just rest (Matt. v. 12, vi. 20; Luke x. 20, xii. 33; 2 Cor. v. 1; Col. i. 5). But it is, when thus used, a metaphorical expression: for that place (if it be one, or places if more than one, and if in either case it may be spoken of as place) is not a firmament, nor a height, nor like a mountain, nor expanses. From this symbolical application of the word heaven, have arisen others, namely, in the sense of spiritual, holy, fit for the presence of God, or even of God Himself: thus heavenly or heavenlies (1 Cor. xv. 48, 49; Eph. i. 3; Heb.

viii. 5), kingdom of Heaven (2 Tim. iv. 18), the Heavens do rule (Dan. iv. 26).

The Earth. The two words in the Old Testament translated earth are of different signification, and used diversely: *Erets*, signifying low or near, means the whole earth or globe (Gen. i. 1), or portions of it, as land opposed to sea (Gen. i. 10), or a particular district of dry land (Gen. xxi. 32); *Adamah*, signifying cultivatable, means earthy soil or ground fit for husbandry (Gen. ii. 5, 7; ix. 20). The terms earth and earthy or earthly are used symbolically, and this in two senses: 1. As earth is below the heavens, to signify inferior things, such as worldly in contrast with spiritual institutions, the civil in contrast with the ecclesiastical rule. 2. In contrast with heaven or heavenly things (used figuratively to mean the presence and the will of God), to signify the opposite, where God's presence is not, where his will does not prevail. Jno. iii. 31; 1 Cor. xv. 48, 49; James iii. 15.

Number and Space. Surely there is the dignity of a mystery in them!
—In the beginning the Creator shewed Himself to be the great Mathematician, and asks, *Who hath measured the waters in the hollow of his hand, and meted out heaven with the span, and comprehended the dust of the earth in a measure, and weighed the mountains in scales, and the hills in a balance?* Isa. xl. 12.
—In the great steps for the accomplishment of his purpose in Man, He proceeds, in like manner, to act according to number: 12 Tribes with 12 Princes to both the literal and the spiritual Israel. Ex. xxiv. 4; Num. i. 44; Matt. x. 1; James i. 1. The materials fixed in number, and the sizes of the Tabernacle with its furniture all told off in cubits (Ex. xxv., &c.); even as the Church, the body of Christ, has its perfect number of members assigned to it, which are being fashioned in secret according to the record in God's book, written while as yet there were none of them. Ps. cxxxix. 16.
—Also, in completing the new creation, He will do the same. Sealing 12,000 out of each of the 12 Tribes by a 12-fold apostleship (Rev. vii. 4), forming the New Jerusalem four square, with 12 foundations and 12 gates (Rev. xxi. 10–21),

and setting in the midst of Paradise the Tree of Life, having 12 manner of fruits. Rev. xxii. 2. For He shall come again as the mighty Numberer and Measurer: as the true Moses counting up the company of his Elect (Num. i. 2); as the great Shepherd of the sheep, passing them under his rod (Jer. xxxiii. 13), that He may present to the great Sheep-owner his flock, saying, Of those thou gavest me I have lost not one (Jno. xvii. 12); as the Wise Master Builder, stretching his golden reed over the spiritual Jerusalem, to ascertain that it is perfectly square, having its length, and breadth, and height of 12,000 furlongs. Rev. xxi. 15, 16.

The powers of Number, and the properties of the figures and forms of Space. These seem to testify to some mysterious quality, more spiritual than physical, for what an astonishing science is Mathematics: ascertaining, on small data, the facts as to number and size, concerning things present, past, or future; stating them accurately in figures, though involving amounts beyond man's comprehension; working out true conclusions as easily on a slate as by counting or measuring objects in nature; and doing this just as well by a blind man, if of vivid imagination, marking his numerals or his lines on the black-board of the darkness before him, as by the man with sight using pencil and paper.

The repeated use in Scripture of certain numbers. This occurring so frequently suggests that they have a mystical meaning, or reference to some spiritual reality.
—Seven probably denotes completeness of plurality in spiritual things—generally both good and evil: 7 lambs, Gen. xxi. 28; Lev. xxiii. 18; 7 lamps, Ex. xxv. 37; 7 sprinklings, Lev. iv. 6; 7 devils, Mark xvi. 9; 7 Spirits, Rev. iv. 5; 7 seals, trumpets, and plagues, Rev. v. 1, viii. 2, xv. 1.
—Ten probably denotes completeness of plurality as to outward things: Tithes, Gen. xiv. 20; 10 righteous, Gen. xviii. 32; Rulers of tens, Ex. xviii. 21; 10 Commandments, Ex. xx.; Tabernacle's 10 curtains, Ex. xxvi. 1; tempted God 10 times, Num. xiv. 22; 10 horns, Dan. vii. 7; 10 men, Zech. viii. 23; 10 virgins, Matt. xxv. 1; 10 talents, Matt. xxv. 28; 10 pieces of silver, Luke xv. 8; 10 cleansed, Luke xvii. 17; 10 pounds,

Luke xix. 13; dragon with 10 horns, Rev. xii. 3; the 10 horns are 10 kings, Rev. xvii. 12.

—Seventy, composed of 7×10, probably means joint perfection of spirituals and temporals: 70 descendants of Noah, and of Jacob, Gen. x., xlvi. 27; 70 shekels, Num. vii. 13; 70 elders, Num. xi. 16; 70 years of captivity, Jer. xxv. 11.

—Five, the half of 10, probably represents imperfection in outward things. This number, with the fraction it constitutes—a fifth-part—characterizes the requirements and the punishments under the Law. Ex. xxii. 1; Lev. v. 16, xxii. 14, xxvii. 15; Num. v. 7, xviii. 16.

—Four probably refers to a four-foldness of action in God's dealings with men: 4 rivers in Eden, Gen. ii. 10; 4 creatures with 4 faces and 4 wings, Ez. i. 5, 6; 4 corners of the land (or points of the compass), Ez. vii. 2; 4 winds, Ez. xxxvii. 9; Dan. vii. 2; Matt. xxiv. 31. In the Tabernacle and in the Church 4 recurs often: 4 pillars, 4-square, 4 rings in 4 corners of four pieces of furniture, 4 bowls, 4 cubits-breadth of the curtains, 4 rows of stones, 4 spices for incense, and 4 for anointing oil, Ex. xxv.–xxx.; 4 Ministries, Eph. iv. 11; 4 sorts of prayers, 1 Tim. ii. 1; 4 living creatures before the throne, Rev. iv. 6; 4 sides of the New Jerusalem, Rev. xxi. 16.

—Three was regarded, both by the Jews and other nations, as a specially complete and mystic number: of which the three degrees of comparison in all languages is a witness; and which custom is confirmed by the rule of art, that perfect comparison must be among three things, and not between two, or among four. Probably it witnesses in some way indirectly to the doctrine of the Trinity. 3 principal feasts, Ex. xxiii. 14, 17; 3 parts of the Tabernacle, Ex. xxvii. 9, xxvi. 33; triple invocation, Isa. vi. 3; Rev. iv. 8; 3 daily prayers of Daniel, Dan. vi. 10; triple vision, Acts x. 16; 3 heavens, 2 Cor. xii. 2; 3 parts of man's being, 1 Thess. v. 23.

—Twelve probably refers to fulness of action in the service of God: 12 stones in the breastplate, Ex. xxviii. 21; 12 gates, 12 Tribes, 12 foundation stones, 12 Apostles, 12 thousand furlongs, Rev. xxi. 12, 14, 16.

—Forty, formed of 4×10, probably refers to full period of probation: Moses in the mount 40 days, Ex. xxiv. 18; Israel's wanderings 40 years, Num. xiv. 34; Elijah's journey 40 days,

1 Kings xix. 8; warning to Nineveh 40 days, Jonah iii. 4; Lord's temptation 40 days, Matt. iv. 2.
—One hundred, and its multiples, probably refers to fulness of submission to God in his kingdom: length of ark 300 cubits, Gen. vi. 15; court of the Tabernacle 100 cubits, Ex. xxxviii. 9; 300 men, Jud. vii. 6; ten out of each 100, Jud. xx. 10; leaders of 100 men, 1 Chron. xii. 14; 100 sheep, 100 pence, Matt. xviii. 12, 28; 100 measures of oil and of wheat, Luke xvi. 6, 7.
—Six perhaps speaks of hopeless toil—of 6 days of labour without a 7th of enjoyment of the fruit: suggesting a not impossible explanation of 666, the mystical number for the name or title of the man who shall be the personal antichrist. Rev. xiii. 18. One labouring 6 days, no reward; 60 days more, no reward; 600 days more, yet no reward!

Vastness of Space. Though, as stated before, p. 22, Space must have limits, yet as its greatness is past man's calculations or conceptions, it seems to offer one of the best emblems of the incomprehensible omnipresence of God. If a man could remain awake and watch the heavens throughout a fine day and a clear night, to him space would appear to be boundless: containing many things, but not constituted, affected, or limited by them: so God's presence is immeasurable, attendant on all things, yet existing also where these are not.

Matter. This is something that consists of atoms, possessing general properties, comprising varieties distinguished by peculiar properties, and submitting to the operations of the physical forces, that pervade all Nature. Is not this half known something a type of another mysterious and only half known something called Manhood, of which the kingdom of Heaven in the earth is to be constituted? This something being more than the animal and spiritual nature of which all its atoms, or individuals partake in common, and something more than those personal differences whereby one individual may be distinguished from another. Is there not the connection of type and antitype in the facts, that Matter is made capable of being subject to the physical forces without any actual change in its nature, and yet with that vast increase of utility which arises from an endless variety in its tangible qualities; and that Manhood is made capable of being subject to an external power which, without producing any such change in individuals as to cause them to cease to be atoms of humanity, can so alter the condition of the spiritual part of their being, as to enable them to be far more serviceable to God and to one another.

Atoms. God has caused Matter to consist of particles so minute that, as stated before, Man has not and probably never will ascertain their ultimate degree of smallness. A trifling grain of indigo when dissolved in a large quantity of water will tinge it all blue, so that each particle of water must have its share of the indigo, and hold one or more atoms of it at least. Yet of such things as atoms worlds are made! Corresponding with which fact in physical things, is God's purpose to establish a glorious kingdom in the earth constituted of such insufficient creatures as we are—each, like an atom of matter, having his place and contributing his measure of assistance in forming the whole: so exhibiting His power, as it is said, *But God hath chosen the foolish things of the world to confound the wise; and God hath chosen the weak things of the world to confound the things which are mighty.* 1 Cor. i. 27.

Simple Substances. Many of these are symbols of spiritual things, that is, they are not only material facts in the visible creation, but have been ordained, by the Creator, to be symbols of spiritual facts in the region of spiritual things, of which they were therefore made, by some quality in them, to be representatives to the extent of being suggestive of them. For symbolism is not an after thought, from seeing material things to resemble somewhat spiritual things, or from feeling the desirableness of it, and by sovereign will determining that certain things should be esteemed symbolic: Wisdom having predetermined the system of symbolism as being reasonable, prepared material things accordingly. Whether all, or only some of the objects of nature are appointed to this service is not quite clear, though analogy would suggest the former opinion as the true one. When we find, as stated above, that oxygen constitutes certainly one half of the crust of the earth, and probably of the whole globe, and remember that it is the principal stimulating cause of the activity of life, both in animals and plants, and also of the changes as to composition and decomposition in mineral masses, one cannot help feeling that it is surely the symbol of some important spiritual thing. The symbolism of simple substances will alone be here dwelt on, selecting the six metals enumerated by Moses in Numb. xxxi. 22, *The gold, and the silver, and the brass (copper), and the iron, and the tin, and the lead.*

Gold. It is a pale yellow substance, "soft, very tough, ductile, malleable, and fusible—unalterable and fixed, whether exposed to the atmosphere or to the strongest heat of furnaces": unliable even to be tarnished by being hidden under rubbish, or by abiding among other minerals in the earth. Gold, as a thing existing, is the symbol of Truth, in the aspect of its positive existence, independently of its being revealed to and accepted of Man; but as made use of in God's service, it was the symbol of Truth engrafted in the soul of men, and thus producing true knowledge in the mind, and truthfulness in the heart. Hence it was the first of the things called for by God (Ex. xxv. 3), to be used in making that Tabernacle in which He would be present in the midst of Israel: corresponding whereunto are the golden-men, truth-full-men, whom alone He will edify into that spiritual tabernacle or temple in the which He will dwell, that the word may be fulfilled, *Behold the tabernacle of God is with men.* Rev. xxi. 3. "Jerusalem the golden" is a company of men eternally embalmed in the Truth. The symbol of so precious a thing must have noble qualities; and men, from the beginning of the world, have done well in highly esteeming it, and using it as a standard of value for other things. It should be observed that the gold was not a thing to be created by the offerers, but was already existing, and was God's property, though in their possession; so also in the spiritual thing, the Truth to be brought up is not man-made opinions about the truth, but that pure thing which is God's: for Christians must ever be in the spirit of saying unto God—As men enlightened and set free by the truth, we offer it and ourselves to Thee, for both are thine. Except for some symbolic meaning, it would be strange for gold to be mentioned at so early a period as in the description of the course of one of the four rivers of Paradise. *And the gold of that land is good.* Gen. ii. 11, 12. Gold indeed is gold, and truth is truth, yet as there is gold of Ophir that is good, so there is truth as it is in the spirit that is more full than it is in the letter. Matt. v. 21, 27, 33, 38, 43. The symbolism of gold is clearly implied in its extensive use in constructing the Tabernacle. The use of the word gold (as also of the word silver, see next article), metaphorically, is seen in the following proverbs: *A word fitly spoken is like apples of gold in pictures* (network, marg.) *of silver.* Pro. xxv. 11. Which means, that the truth should be presented in such a manner only as love suggests. *As an ear-ring of gold and an ornament of fine gold, so is a wise reprover upon an obedient ear.* Pro. xxv. 12. That is, as an ear upholds in honour the ear-ring, so does an obedient ear do honour to the word of truth spoken to it.

Silver. It is a white substance, resembling gold in most of its properties, but possessing that of ductility in a much less degree. Silver, as a thing existing, is the symbol of Love in the aspect of its positive existence, independent of its being quickened, or not quickened in Man; but as made use of in God's service it was the symbol of Love shed abroad in the soul of men, and thus causing the heart to love God and all whom He loves, and the mind to be occupied with godly things. Hence it was the second thing called for by God, that his Tabernacle might be framed: its anti-symbol, Love, being in like manner as Truth, absolutely necessary for qualifying the men whom God will edify into the antitype of the Tabernacle, the body of Christ. As the Silver to be offered was not of man but of God, so much more must the Love be of the Spirit and not of the flesh. Silver has rightly been ever prized: would that its anti-symbol were as much, or more so! When God commanded that every man should offer a half shekel of silver (as from Ex. xxxviii. 25 it is seen to have been) as a ransom for his soul (Ex. xxx. 13), why was it not said, Or of gold to the value of the silver? So also, why should the hooks of the brazen pillars of the court, and the gold-covered pillars of the Holy Place, be of silver, while those of the gold-covered pillars of the Most Holy Place were to be of gold? Because in the spiritual antitype of the Tabernacle the actions of ministry referred to by the hooks are in two cases more especially those of Love, and in the third more that of the Truth. As there is a catholic apprehension of truth that excels, so is there a catholic exercise of love that is more heavenly. Ps. xii. 6; Matt. v. 43–48. The figurative use of the word Silver may be seen in the proverb, *The tongue of the just is as choice silver: the heart of the wicked is little worth*, Prov. x. 20: meaning the word of those who speak according to righteousness will always be a word of love—and therefore prized—while the word of the unrighteous, even though true, will never be acceptable.

Copper. "It is a substance of a peculiar reddish brown colour; is hard, sonorous, very malleable, and ductile." Copper, as a thing existing, is the symbol of the persistence of God's decrees, their enduring till fulfilled; but, as used in God's service, it was the symbol of Faith, or that phase of Faith called Hope (if the two words mean not the same thing), in respect to its inducing endurance of opposition and perseverance in well-doing: for he who cherishes this gift can serve God here and hereafter. Luke ix. 62; Matt. xxiv. 13; Heb. vi. 15, xi. 27, xii. 2. Hence it was the third thing (in our translation, brass, no doubt by mistake,) called for towards framing the Tabernacle with its court (Ex. xxv. 3): being the metal chiefly used in the framing and in the furniture of the court, as gold was in that of the Tabernacle itself—for even the earliest service must be of faith. As Truth and Love, so Faith is a requisite in those men whom the Lord shall perfect in Himself: and as of those endowments so of this, it is not of the flesh but of the Spirit. As there is a catholic truth and love, so is there a catholic Faith (not doctrines, but the spiritual grasp that holds them fast), which is most serviceable to God. 1 Thess. v. 21; 1 Tim. v. 21; Jude, ver. 3. Copper (or brass) is often referred to in Scripture where tenacity in action is pointed at, whether in good or in evil. Num. xxi. 9, Serpent of brass: an enduring means of grace. Deut. xxviii. 23, The heaven shall be brass: enduringly shut. Ps. cvii. 16, Is. xlv. 2, Gates of brass: enduring captivity. Is. xlviii. 4, Thy brow brass: enduring opposition to reproof. Dan. ii. 32, His belly and his thighs of brass: a monarchy possessing regal endurance. Dan. vii. 19, Nails of brass: capable of enduring long use in acts of devastation. Rev. i. 15, His feet as fine brass: capable of enduring service.

Iron. "It is a substance of a bluish white colour, of considerable hardness and elasticity; very malleable, and exceedingly tenacious and ductile: yet rusts rapidly on exposure to the atmosphere." Like gold in some things, Iron is diverse in this last particular, and is therefore the symbol of Truth held in unrighteousness, and consequently unproductive of the good results that ought to be: this being especially seen when the powers and talents in Man, which are realities, are used in the spirit of wilfulness and self-dependence; and hence Iron is sometimes said to be the symbol of the strength of the flesh, or of the natural man. It was not used in the construction of the Tabernacle. It has in Scripture an evil meaning. Deut. iv. 20, Iron furnace: bondage and oppression of brute force. Deut. xxvii. 5; 1 Kings vi. 7, On stones of altars no iron tool to be used: no mere exertion of the flesh. Job xl. 18, Behemoth's bones like iron: the frame-work of the spiritual behemoth strong in the power of the natural man. Job xli. 27, Leviathan esteemeth iron as straw: the spiritual leviathan shall trample down the power of mere men. Ps. ii. 9, Rule them with a rod of iron: by the oppressive power of rulers strong in the flesh. Ps. cxlix. 8, Bind kings and nobles in fetters of iron: rulers given into the power of men in the flesh. Dan. ii. 33, His legs of iron: the fourth monarchy strong (ver. 40) in all the natural powers of manhood. Dan. vii. 7, Teeth of iron: Roman conquests by creature force. Rev. ix. 9, Breast-plates of iron: their defence the natural powers of the creature.

Tin. "It is a substance of a yellowish-white colour, scarcely at all sonorous, very malleable, though not very tenacious:" used as a substitute for silver in many domestic utensils. Tin is the symbol of the love of the natural man: mere selfish love, like that of domestic animals to men. Isa. i. 3. It was therefore not used in the construction of the Tabernacle or Temple. It has in Scripture an evil sense. Isa. i. 25, Take away thy tin: purge out the poor pretence of love, which is brittle, and therefore worthless. Ezk. xxii. 18, All they are tin, they are the dross of silver: Israel had no true love to God.

Lead. "It is a substance of a white colour considerably tinged with blue, very soft and flexible, very brittle, and consequently not ductile: possessing great specific gravity." It was used as a flux to fuse other metals. Jer. vi. 29. Lead is the symbol of wickedness, in its phase of being the fruit of the will of the flesh, therefore having no endurance: rather promoting the melting away of those with whom it is intermingled; or dragging them down out of the light of heaven. Ex. xv. 10. It was not used in the construction of the Tabernacle or Temple. It has in Scripture an evil signification. Ezk. xxii. 18, All they are lead; they are the dross of silver: Israel rendered no persevering service to God, being full of wickedness. Zech. v. 7, 8, A talent of lead: used as a covering of the abode of wickedness, it probably intimated that a covenanted people glorying in their own works shall be sealed by their wickedness unto certain destruction.

It is opined by some, in extension of a tradition among the Jews, which was esteemed not improbable by the early Fathers of the Church, that not only as the physical creation was accomplished in six days, the new creation (Is. lxv. 17) will be perfected in six one-thousand-years periods (now nearly run out), but further, that the course followed by the Creator in bringing up Chaos into the condition of a world perfect according to its nature, will be followed (spiritual action for physical action) by the Redeemer in bringing Manhood from its chaotic state (through the Fall) up into a perfect condition according to its nature, 2 Cor. iv. 6. If this opinion be correct, then probably the following are true analogies, and any others that suggest themselves while considering the work of each day, may be noted at the end of the corresponding Section.

Like to what Matter was during that night which formed the beginning of the First Day, was Manhood the moment after the Fall: spiritually, without form and void, and darkness resting upon it. It contained, indeed, like chaos, all the requisites for the fulfilment of the purpose of God, but as yet they had not been developed into use: as the powers of man's body, so also the powers of his soul and spirit, not being brought into full action till after he had eaten of the Tree of the knowledge of good and evil.

Like as the Spirit of God brooded on the physical chaos to prepare it for its glorious course of changes into a world fit for the purpose of God, so has He brooded over the spiritual chaos to sanctify each particle of it unto obedience, that it may fulfil the will of God, according to the part assigned to it, by Him, for its assisting in the accomplishment of his purpose concerning the new heaven and the new earth.

III. FIRST DAY'S WORK.

FIRST: A SUMMARY OF COMMENTS ON GEN. I. 3–5.

Gen. i. 3–5, *And God said, Let there be light: and there was light. And God saw the light that it was good: and God divided the light from the darkness. And God called the light Day, and the darkness he called Night. And the evening and the morning were the first day.*

In these verses four things are declared together, which therefore must be accepted reverently as equally true, and, if not equally important, each forms a portion of the narrative, which would be changed by the omission or alteration of any one of them.

And God said. This form of expression introduces the history of the work of the five subsequent days also, and is therefore generally assumed, as before stated, to indicate the beginning of the work of the first day: thus, apparently, shewing that the Matter of the heaven and the earth was created previously.

Let there be light. This order, following so soon after the declaration that God created the heaven and the earth, seems, of all the commands recorded in this history, to be the most positive act of creation. It was not said, "Let the heaven," or, "Let the earth bring forth light," but apparently a call on light to come into existence. The Student of Nature can urge various reasons, of great weight, why we must believe that Light already existed among the heavenly orbs, and therefore that the command, here reported, must have been merely a call on light to come from the further parts of the Universe into the region of the earth. On the other hand, the declaration which follows, that *God saw the light that it was good* certainly intimates a judgment on the sufficiency, for the purpose in view, of a new thing. But questions of the very first importance in considering this matter seem to have been overlooked, namely, What did the term *Light* mean in the mind of the Creator? Was the light then produced according to His will the same as the light we are acquainted with? Apparently it must have been so, because, though the word was uttered before there were men, the record of it was made 2,500 years after men existed, and was written for men, and therefore must be understood as referring to the light they were acquainted with. Was Light another substance of Matter added to the various sorts already in existence, or was it a physical power then produced to operate certain effects on the matter already created: as, from the discoveries of science, there is every reason to believe is the case? And, lastly, whether it was substance or force, Was it provided merely that men, and other creatures with eyes, should be enabled to see things?

It is very needful here to make a digression, and consider what Light is, and therefore what the Creator meant to bring into operation when He said, *Let there be light.* The last question suggested above, the thoughtful reader, though unacquainted with science, can answer in the negative; for he knows that sunshine brings heat as well as light, and that both are at least as necessary for plants as for animals. The Student of Nature discovers that there exist around us, not only various substances, but also several active powers, effecting outward motions and internal changes in material bodies. He perceives that they manifest the energy of force in in-organic matter, as the powers of life do in organic bodies, that is, in plants and animals: they being the agents or means whereby all the phenomena in the in-organic, and of many of those in the organic Kingdoms of Nature are produced.

Of these physical forces, Light is evidently a chief one, for it only is named, and its action on this globe began, as we see, on the First Day: its distinguishing between Day and Night being apparently, at first sight, its only service. But Light, it is found, does not produce one effect only, namely, day-light, but also warmth, colours, and the perfumes and flavours of vegetables, flowers, and fruits. Careful investigation shews that Light is either a power acting in such different ways as to produce very different effects, or else composed of distinct forces; so that sunlight in reality is not, as even artificial light is not, mere light in the ordinary understanding of the term, but comprises streams of power, probably four, of diverse action, producing light, heat, colour perfume and flavour, and apparently some fourth effect not yet well ascertained.

But Light, whether it be one power having a fourfold action, or comprises four distinct powers, is not the only physical force engaged in producing the endless phenomena of Nature. Two other fourfold forces, or two other energetic combinations constituted of four powers each, are found to be in action, of which the generic names are Attraction and Electricity. So that the physical forces consist, apparently, of three fourfold ones, or twelve single ones. Now, because the laws regulating the actions of these forces appear to be the same, or nearly so, a suspicion has been excited in the minds of some that possibly there may be but one force, producing varied effects according to the cause stimulating it into action. This suspicion in the mind of the Student of Nature raises another in the mind of the Bible Reader, namely, that the name Light on the First Day, was used as a family name for all the Physical Forces, and that possibly *Let there be light* meant, in the fiat of the Creator, "Let all the ordained physical forces now begin to operate on the simple substances of which the earth without form and void consists." Some confirmation of this arises from considering three small matters. 1. Light caused day to exist, and day is the period appointed of God for man to work in (Ex. xx. 9; Jno. xi. 9), and therefore the terms, the light, or, the day, are of frequent use in Scripture as symbols of all earnest, honest work. It therefore does not seem inconsistent with the *Testimony* to suppose that *Light* may here be intended to be the representative of all those physical energies appointed of God to remove from, and thereafter, by continuous action, to aid in keeping from the earth the reproach of being without form and void. 2. The special mention of Light only, because it is the chief, or to men the most striking phase of the action of physical forces, does but correspond with the special mention of whales (whatever creature is meant thereby) in ver. 21, because they were the chief animal brought forth by the waters. 3. If the other physical powers are not included in the term Light, there is no record of their creation or appointment to serve on this globe; for they are not, like the vital powers of plants and animals, virtually declared to be created on any of the other days.

Returning now to the text, the words that follow are, *And there was light.* On the assumption of the contemporaneous production of all the Physical Forces, and that they are all included in the name of the most prominent of them, Light, these material powers now entered on an immense field of activity. Matter existing in a state of loose atoms, all endued with general properties, and each possessing, in addition, some peculiar quality that marked it as being part of one of the 65 simple substances (see page 25)—Matter under such circumstances, if invaded by the whole Physical Forces, would be aroused from its inert state into a condition of the most stupendous excitement: these forces accomplishing, with inconceivable celerity, that whereunto, for the time being, they were sent. All or most of the substances now found in Nature (excluding, of course, the mineral strata formed since that time, with any peculiar mineral compounds produced by those changes), and amounting to about 350, would be compounded during the day, amid an exhibition of light, heat, and electric phenomena, such as we can form but a faint idea of. For if chemical operations, conducted on a small scale, are attended with the production of light, alterations of temperature, and excitement of electric currents, what must have been the measure of these phenomena when the whole globe was one laboratory, with every chemical operation proceeding at once: the progress being pressed on because the work was great and the time short!

And God saw the light that it was good. These words certainly read as if light was a new thing; therefore put to the proof, and being found to answer, obtained an expression of approbation. The Creator, as a wise master workman, executed his great work in portions, proving each part in succession, and not till He had seen that it was effective, did He ordain it to continue. It is probable that the creative fiat came forth in the morning, and the confirmative approbation toward the evening. God of course knew beforehand that it would be good, yet thus He acted, and his doing so is recorded for our instruction, that we may learn what true wisdom is. And men who are wise have so acted in their little works; for in complicated machinery, is not each piece examined bit by bit as soon as it is made, to ascertain whether its size and strength and polish be correct before the whole is fitted together.

And God divided the light from the darkness. The light was not allowed to spread over all the earth at one time; part only enlightened by the light, part left in darkness. It should be remembered that the history is speaking of the earth only. This was before the Sun was made to be a light-bearer to measure out the length of the day, but when it is urged that therefore the statement in the narrative was impossible on the first day, it is forgotten that He who provided for this being done permanently could arrange for its being done for a short space, though we are not told how He effected this.

And God called the light Day, and the darkness he called Night. Lit. Trans., *And-called God to-light Day, and to-darkness he-called Night.* The difference between light and darkness, one would have thought, sufficiently distinguished them; but God stamped the difference by names: just as afterwards He had the animals separated. Surely there is some lesson in this, and the emphatical use of the terms light and darkness, of day and night, in subsequent scriptures seems to confirm this. See page 19.

And the evening and the morning were the first day. Lit. Trans., *And-was evening and-was morning day first.* As this form of expression is repeated again with respect to each subsequent day, it is worth while to consider it a little. The first impression made by these words, after reading that the period of light was called Day, is that from the ending of the light looking back to the beginning of it formed one day, *i.e.*, of twelve hours. But the literal translation seems to say, There was an evening [darkness] and there was a morning [light], which together formed the first day—*i.e.*, of twenty-four hours. So also in subsequent Scriptures the word day more often signifies a day of twenty-four hours than of twelve, and this latitude in the use of the term exists in all modern languages, and when precision is necessary, we say, natural day, artificial day, civil day. But the thought arises, is this double use of the term here merely indifference to precision, or is there a teaching couched under it? May it not teach that, though to any one spot on the earth's surface the time of light or day is twelve hours, and the time of darkness or night is twelve hours, the natural day to the globe as one whole is twenty-four hours of unceasing light; and that the natural days succeed one another without the intervention of any night.

SECOND: A NOTE OF THE CHIEF RESULTS OF THE CREATIVE ACT OF GEN. I. 3-5; AND OF THE SCIENCES FOUNDED THEREON.

The words, *Let there be light, and there was light*, make, comparatively, little impression on the uninstructed mind. It is, therefore, not a mere amusement but a duty to consider what may be included in this brief expression. If the assumption, hazarded in these pages, be correct, namely, that the creation, or bringing into action on the globe of all the Physical Forces, is included in this record, then all the beneficial agencies at work in Nature, and in the arts which men have founded through their knowledge of these things, ought to become vividly present to our thoughts when we hear the words, *Let there be Light.* For this short fiat bestowed on us one power, having a dual action, operating in a dozen different ways; or three fourfold powers (all or most of them with a dualistic action); or twelve single powers (each or most of them having, however, a dualistic action) to operate on matter for our benefit. These compound powers have been designated, Attraction, Light, and Electricity.

Before explaining briefly the nature of these compound agents, stating the characteristics of the four streams of power comprised in each, and pointing out the sciences founded on them, it is necessary to observe that just as men, with all their knowledge of natural things, are still ignorant of the size, form, and substance of the ultimate atoms of Matter, so, in spite of all their familiarity with the effects of the Physical Forces, they are still uncertain whether these are powers simply, or are Matter operating in a state of inconceivable rarity, like some subtile ethereal fluid (a term invented to represent, as x y z do in algebraical equations, the unknown thing) existing in a state of incessant action, or incessant tendings to act, according to fixed laws: producing, under different circumstances, very different effects.

In the absence of this fundamental knowledge concerning Matter and Force, it has been esteemed of service to contrast them thus. Matter occupies space, its atoms obey the force of cohesion, its masses are subject to the force of gravitation. Physical Forces have none of these qualities, and therefore have been termed, Imperceptible, Incoercible, and Imponderable.

Whether this assumption, as to the contemporaneous creation or production on the earth of the Physical Forces, be correct or not, we know that they exist, and that they were all created by God; and as they so much resemble one another, and are collectively to inorganic matter what the energy of life is to organic matter, it is not unreasonable thus to consider them all at once.

The Physical Forces operating around us, while all are evidently nearly related one to the other, seem to be grouped together in fours by a still greater resemblance—as follows:

—Attraction, comprising Attraction of Cohesion, of Election, of Crystallization, and of Gravitation.

—Light, comprising Light, Heat, Chemical Rays, and those other rays not yet mastered.

—Electricity, comprising Electricity, Galvanism, Magnetism, and Electro-magnetism.

On each group a few observations require to be made.

Attraction produces such a variety of results that, whether it be one force or four, it is convenient to distinguish its several operations by different names. The knowledge attained to by man of the facts concerning Attraction—both the laws of its action, and the results of its operation—has not been framed into any distinct science, but it forms the foundation of Mechanical and Chemical Philosophy, and consequently of all the arts that have become somewhat matured. It therefore seems most convenient to offer what remarks have to be made on the scientific or economic use made of the powers of Attraction at the close of the statement respecting the nature of each.

1. Attraction of Cohesion. This is that phase of the action of Attraction which is seen in its causing the imperceptible atoms of matter to adhere to one another, more or less strongly, and thus to form very perceptible lumps or masses of simple or compound substances. Until this peculiar effect of Attraction was ordained, there could be no solids or fluids; and unless this power had been continued there could be no such conditions of matter now. The degree of efficacy in this power depends both on the nature of the substance on which, and the circumstances under which, it is acting: when not opposed it produces solids, when partially hindered it produces fluids, and when wholly counteracted the result is that matter, through the action of another force called Repulsion, assumes the gaseous form. When a solid is broken, the two pieces cannot be made to reunite as before by being merely pressed together: but in some cases the force of adhesion can be renewed by a mechanical or chemical process. Heat is the chief opponent of cohesion, but its power is also affected by the arrangement of the particles in a substance: as in wood, which can be more easily split than broken.

Attraction of Cohesion, the Force which has just been spoken of, exists naturally in different substances in various measures, and its energy changes in each according to circumstances. It is of primary importance in all practical sciences (though it be not itself the object of investigation), as well as in all the arts. In the making and using of scientific and manufacturing instruments (using the term in its widest sense); in obtaining the materials for them (which of course includes all means of transport; whether they be got above or below the surface of the ground, and in the same or another country); and in framing the manifold objects of the desire of men—the strength (in its many forms) of the materials made use of, is a matter of the greatest interest. This strength may be in favour of, or in opposition to the object men have at the time in view, and therefore how to increase it or lessen it is often a question of much consideration. The strength or weakness, the hardness or softness, the toughness or brittleness, the rigidity or flexibility, the tenacity or ductility, the liquescency (whether by infusion or by smelting) or stubbornness of the materials made use of by men, depends in part on the degree in which this force is operating in them. Hence Tables of strength have been compiled from the experiments and experience of many observers, and are esteemed to be of inestimable value.

In those arts which are partly mechanical, partly chemical, the action of this force is enlisted: in plastering, brick-making, earthenware manufacture, melting metals, welding iron, soldering metalic plates, &c., men imitate by using this power of Nature; in other trades a weak cohesion called adhesion is taken advantage of, such as painting, white-washing, pasting, glueing, &c.; while in domestic matters many rules for producing or dissolving the power of cohesion, as in cooking, &c., are daily made use of.

2. Attraction of Election, or Chemical Affinity. This is a power constraining atoms of different sorts of matter to coalesce, when free to act, in certain definite proportions, and not otherwise; and thus to form masses of compound substances, having properties different from those of their elements: these substances assuming the form of solids, liquids, or gases according to circumstances. This law of Chemical Affinity has two chief points. 1. It causes atoms of one variety of matter to cohere to the atoms of other sorts, but with different degrees of force; so that if several sorts be present together under circumstances that afford full liberty of action, the atoms of the two which have the

strongest attraction for one another will unite; or, if when two varieties of simple substances have formed a compound substance, another simple substance that has a stronger attraction for one of these than the one already united to it has, such substance will dissolve the bonds between those two, and seize on the one for which it has the affinity or election, as it is called. 2. It rigidly compels these compositions and decompositions to be effected according to certain fixed proportions of weights or measures: hence the rule of action is called the law of definite proportions. This rule is so exactly fulfilled by the atoms of different sorts of matter, that their proper proportions in all compound substances are more accurately measured out than could be accomplished by the most skilful chemist.

By this force of Elective Attraction the simple substances which (and which alone according to our supposition) were brought into existence by the act of creation, were in accordance with the rule of definite proportions formed into compound substances possessing new properties, and by the same force every act of decomposition and composition daily performed, both by Nature and by men, is accurately effected.

The knowledge concerning this curious force that men have acquired, forms the science of,
—Chemistry: of which the branches are—
- —Simple Substances;
- —Compound Substances;
- —Chemical Affinity;
- —Law of Definite Proportions.
- —Analysis of Substances:
    - —of In-organic Substances,
    - —of Vegetable Substances,
    - —of Animal Substances.

This science, in its present advanced state, with the arts founded on it, is of the utmost importance to men, both as regards their progress in discovering the secrets of Nature, and their provision of food, raiment, and luxuries for their existing in comfort. Under the guidance of rules established by it, men are enabled to decompose compound substances, and to get the use of their elements as simple substances, or to recombine them with others into compound substances, more easily thus obtained, or in larger quantities than from Nature. Thus men supply themselves with lime, soda, and potash; sulphuric, nitric, and phosphoric acids; beer, wine, and spirits; dyes of many sorts; and mineral, vegetable, and animal drugs for medicines.

3. **Attraction of Crystallization.** Under suitable circumstances the atoms of a substance, whether they be all of one sort of Matter, or of two or more sorts in the proportions dictated by the law of definite proportions, while uniting together by the force of cohesion, arrange themselves so as to give the mass they form a peculiar inward structure tending to produce an outward form, consisting of mathematical shapes, having flat sides, straight edges, and well defined angles, of sizes peculiar to each simple or compound substance. The action of this force is regulated by the Laws of Number and Space spoken of in the last Chapter. Hence though the forms of crystals seem at first sight of an endless, indiscriminate variety, yet on being studied they are found to be the variations of six fundamental forms, and can be arranged into as many families or groups. It may be noted, in passing, that a substance is in its purest condition when it is crystallized, and is therefore less liable to decompose than when it is in the condition called compact.

It is owing to the peculiar action of this Attraction of Crystallization that crystals and crystaline masses of different substances were formed at the first, and have been since in all or most of those convulsions of Nature whose histories are hinted at in the rocks: to it is owing the crystallized state of the materials which form the rocks that constitutes the foundation of the present crust of the earth, and are believed, with good reason, to be the oldest discoverable by Man; to it is owing that brilliancy of precious stones which chiefly constitutes their value in the eyes of men; and to it is owing the formation of crystals still carried on by Nature in crevices of the earth, and that men can, to some extent, imitate her work.

The knowledge of the results of the Attraction of Crystallization which men have accumulated, forms the science of, Crystallography: a geometrical science that is of importance in Mineralogy, for the determination, in doubtful cases, of the true nature of a crystal by the angles at which its facets are set. The knowledge of the modes of using this power forms a branch of Chemistry, and is utilized in some of the chemical arts for the obtaining of simple or compound substances in their greatest degree of purity: for if a mass of impure mineral substance be dissolved in water or other suitable menstruum, and then the liquid be allowed to evaporate slowly (as they do to obtain salt, &c.), or if it be melted and then allowed to cool slowly (as they do to obtain sugar, &c.), in either case the substance is found to have crystallized, and to be free of all impurities.

4. Attraction of Gravitation. This phase of the action of Attraction is that which it exhibits when operating on masses of matter that are at a distance the one from the other. Its effect is simply to draw such masses nearer together, and to keep them so: hence objects on the face of the earth are kept there, and if lifted above its surface and left unsupported are drawn down to it. Or, if another force hinder the two masses from coming close together, they approach as near as that force will permit and there remain at that distance: hence the earth remains, on an average, at the same distance from the sun, and the moon from the earth, and neither can ever touch its centre of attraction as long as the constitution of the solar system remains what it is. Whenever the energy of this force was set to act on the materials of the earth, it would cause them to form a globe, or rounded form, and whenever the earth was made to commence the rotation on its axis, this form would assume that oblate rotundity in which it now exists. As these two changes would, apparently, remove from the earth all foundation for the declaration that it was without form, it seems to follow that this force did not act on its materials till the First Day. As to the time when Attraction of Gravitation between the sun and the earth commenced, and of course the earth's course in its orbit, it is a difficult point to speak about. If the Bible Reader should assert that it was not very long before the work of the First Day which we are considering, for that then only the earth, with the Sun, Moon, and Planets were created, it might be rash, but not more so than if the Student of Nature asserts that all the solar systems of which it is understood the

heavenly host is composed must, of necessity, have been created at one time: the question being, at present at least, beyond our power to settle.

The power of this force in drawing bodies towards one another, and the velocities generated by it, are fixed and unchangeable, and, since they were ascertained, men can represent them either by numbers or in diagrams, and thereby make as reliable calculations concerning them as though they were visible and tangible objects lying on a table before them. Thus: Gravitation in bodies causes them mutually to attract one another, and this in proportion to their respective quantities of matter, proving that the density of different substances is very unequal; it acts with a degree of force inversely as the square of the distance between the bodies; and it produces a velocity in the bodies increasing as the square of the time in which it acts.

Attraction of Gravitation, that force which is continually either aiding or hindering man in his toil, forces itself on our attention in every branch of Mechanical Philosophy—Mechanics, Astronomy, Hydrostatics, and Pneumatics—in the numerous arts founded thereon, and in all our actions in every-day life. Its assistance is secured in a vast number of ingenious ways, and its opposition is counterbalanced or lessened in various modes that experience has suggested. Its aid is taken in such cases as in the gaining of enormous power by water wheels, and the steam-engine in its old form; in the obtaining of accuracy in clock-work; in the using of scales and weights; in the supplying of water for domestic purposes; and in the removing of sewerage from houses and towns. Its hinderance is felt and more or less remedied in such cases as, in the raising, conveying, and supporting of weights by the use of cranes, carts, and uprights; in easing friction in all machinery and carriages, whether on the road or on railways, by making the rubbing parts bright and lubricating them with grease; in making men, too heavy to do so of themselves, to mount in the air, by attaching them to balloons, when the very power of gravitation, acting more strongly on the denser air, squeezes the balloon with its freight upwards, instead of holding the men down as before.

Sun-light. What light can be said to be, philosophers are not agreed, but, like Attraction, it produces such different results that, whether it be one force or more, it is convenient to distinguish its several operations by different names, and consider each one separately: this is here done, numbering them in succession with the other forces. Light can be analyzed, or rather divided into several component powers, by being made to pass through a glass prism, when the following results are obtained: 1. A display of streaks of colours, comprising the three primary ones—red, yellow, and blue—attended by four secondary ones, which doubtless are the products merely of the primary ones overlapping one another, and therefore need not at present be attended to. The yellow rays are the most luminous, the red next so, and the blue the least. 2. A gathering together, into a comparatively compact stream, of a large portion of the power that is in Sun-light to produce heat—designated Caloric or the calorific rays—which usually is uniformly intermingled with the colourific rays, but now exhibits its greatest force just beyond the red rays: its presence in the yellow and the blue rays being successively less and less. 3. A gathering together, in like manner, into a comparatively compact stream, of a large portion of the power that is in Sun-light, to promote chemical changes—designated Actinism or the Actinic rays—which usually is uniformly intermingled with the colourific and calorific rays, but now exhibits its greatest force just beyond the blue rays: its presence in the yellow and the red rays being successively less and less. 4. In experimenting with these separated portions of Sun-light, observers report that they, on some occasions, find the expected results modified in such a way as to lead them to suspect the presence of some fourth part or power of Sun-light, and to expect that this will yet be laid hold of, and its character ascertained: though at present they are not ready to speak about it particularly, and to give it a designation. While the existence of such fourth power may not be assumed, it is considered good to keep this probability in view.

5. Light (in its restricted sense of colourific rays merely) is that physical power which causes natural objects to become

visible to the eye of men, and of such other creatures as are provided with this organ. Its chief sources are the sun, combustion, and electricity; its lesser ones are friction or percussion between solid bodies, and decomposing vegetable and animal matter. Its laws of action are, that it radiates from its source equally in every direction; that it proceeds in straight lines, travelling at the rate of about 200,000 miles in a second; that it enters into, and is absorbed wholly or partially, by opaque bodies; that it passes through translucent bodies in a slightly changed direction; that it is reflected from polished bodies at an angle equal to that at which it meets them; that its power of illumination decreases as the square of the distance from its source; that, as above stated, in passing through a translucent prism it becomes divided into red, yellow, and blue rays, which on being recomposed, by passing through a second prism, again form white light.

The use of light in Nature, besides that of supplying the means of vision to all creatures having eyes, is to colour all objects according to their powers of reflecting different coloured rays, as is done in perfection by the rainbow; and to quicken the vital powers in plants and animals which do not thrive without it.

The knowledge which men have acquired respecting Light is very important and of extensive application. It forms the science of,

—Photology or Optics, of which the branches are—

- —Nature of Light;
- —Its Sources;
- —Radiation and Course;
- —Catoptrics, or Reflection;
- —Dioptrics, or Refraction;
- —Chromatics, or Analysis;
- —Polarization of Light.

The practical uses made of this science are in constructing instruments to assist the eye (mirrors, lenses, spectacles, telescopes, sextants, microscopes, camera obscura, camera lucida, magic lanterns, kaleidoscopes, &c.); in astronomy and navigation; and in the use of artificial lights in lighthouses, public buildings, and private houses.

6. Heat, or Caloric (as it is sometimes called, leaving heat to express the result of its operation), is another physical

force, the effects of which are manifold, varied, and of great importance in nature and in art; but for the most part the opposite of those of Attraction, and therefore this power is sometimes spoken of as Repulsion. The principal facts concerning it are the same as those of Light, with which it is always associated, and which it always tends to produce —save in a few exceptional cases. Its principal sources are the sun, and combustion; its lesser ones, percussion or friction of solid bodies, compression of æriform fluids, and chemical combinations: this last including animal heat, which arises from the chemical changes produced in their bodies by breathing and digestion of food. Heat radiates in straight lines, is arrested by opaque bodies which thereby become warm or hot, passes through translucent bodies, is reflected, and refracted. Besides all which, its introduction in sufficient degree expands solids into liquids, and these into gases; and its abstraction reduces gases into liquids, and these into solids: in the first set of these changes heat being greatly absorbed, that is made latent, and not detectable by the feelings; while, during the last, this latent heat is given out, that is, becomes sensible.

The uses of Heat in nature are, if possible, more important than those of light: if it is correct to express such a comparison between two things which are both absolutely necessary. The varying degrees of heat, caused by the changes of the earth's position in relation to the sun, constitute the seasons of winter, spring, summer, and autumn, with their respective advantages; while those arising from a difference of position on the earth's surface, and of height above the level of the sea, constitute the varieties of climates, with their respective advantages. The heat of the sun causes water to evaporate, that is, rise like steam from the sea (free of salt), lakes, rivers, and land; it also causes the atmosphere both to suck up water from the same sources, and to absorb that which rises of itself: thus providing a supply of water for dew, mist, rain, (and by abstraction of heat) hoar-frost, hail, and snow, whereby the plants of the earth are enabled to obtain nourishment; and springs, streams, and rivers are produced for the use of Man, beasts, birds, and fresh-water fishes. By alternations of temperature, summer's heat and winter's cold, rocks are disintegrated, and stiff clays are crumbled down into useful soils, which go on improving by successive exposures to the same. The heat of the sun is necessary to the existence of all the members of the vegetable and animal kingdoms; while, in addition to this, Man in many climates stands in need of much more, and obtains it from the combustible materials around him.

The knowledge which men have attained to of the properties of heat is of the highest importance to them, and the uses they have made of it are innumerable. It constitutes the science of,

—Thermology, or Laws of Heat: of which the branches are—
  —Nature and sources of Caloric;
  —Radiation, reflection, and refraction of heat;
  —Communication, modification, and equalization of heat;
  —Mechanical effects: expansion of solids, fluids, and gases;
  —Chemical effects: promotion of composition and decomposition.

The uses to which this knowledge is applied are legion: furthering every branch almost of science. It guides in the choice of the materials and the form of clothing, and of houses with their furniture, including, in the last item, stoves, fireplaces, and furnaces, with the various sorts of fuel, for the parlour, kitchen, and wash-house. It is useful in all the mechanical, and necessary in all the chemical arts: without it, steam-engines (stationary, moveable, and locomotive) were powerless, and metals of very limited utility; of the acids, alkalies, and salts of many sorts, that now are subservient to the service of men, those which are found in Nature would yield little benefit, and those that are artificial could not be formed; and those things from which men find it advantageous to make decoctions, as from dye-stuffs to please the eye, from aromatic plants to please the palate or the nose, and from drugs to heal the body—would exist in vain.

7. Actinism. Sun-light comprises, further, a pencil of rays which greatly facilitates chemical changes in the objects of Nature, and hence have been called the Chemical Rays, or Actinism. This is found to be in most powerful action

just beyond the blue rays in the prismatic iris, the opposite side from heat, and to be less and less energetic in the successive portions of the spectrum. The service of the Actinic rays in nature is quite indispensable, seeing that they stimulate the chemical operations in the juices of plants and animals so as to mature the substance of these organized bodies, the test of which is their acquiring the colours, flavours, and perfumes peculiar to each.

The knowledge concerning this power that men have gained is as yet but very limited, and therefore though this Physical Force has obtained a name, we can scarcely say that there is a science of,
—Actinism.

The uses, however, to which they have applied this force, as existing in Sun-light, both before and since the discovery of its separate existence, are very important. From the beginning of the world, gardeners and agriculturists have known the value of sunshine to their plants and crops, and have consequently taken care to avoid positions for their labours where the shadow of big trees, or high rocks would mar their success. At an early period it was discovered that sunshine would bleach yarns and cloth, and the taking advantage of this in a rough way for domestic purposes gradually led to its being done in a more orderly manner—especially in connection with vitriol, &c.—by professional bleachers. But a more astonishing, though not a more important use of this power, has arisen recently in the art of Photography: which is dependent for its existence on this Physical Power.

8. The fourth constituent power of Sun-light. Reference has been already made to this, as being suspected to exist, though as yet scarcely proved, because nothing precise has been ascertained respecting it. The suspicion concerning it is kept in remembrance here, because, besides other reasons, there being four sorts or modes of action of Attraction, and four sorts or modes of action of Electricity, it seems highly probable that it is not groundless, and will, at no distant day, be confirmed.

Electricity. What this is in itself the Students of Nature have not been able to discover, but, like Attraction and Sunlight, it appears to be of such diversified action in Nature, that whether it be one power or four, it secures clearness of view respecting it to give to each diverse mode of its operation a distinct name, as before stated, and to treat of it separately. This course is here followed, numbering them in succession with the other forces.

9. Electricity (in its restricted sense of being that natural force which men can elicit from various substances by friction), is a Physical Force exhibiting in a high degree that dualism or twofold action—attraction and repulsion—formerly alluded to. To distinguish these actions it is necessary to use language that might be supposed to imply that there are two sorts of Electricity, Positive and Negative, but it is meant to mark the two sorts of its operation: that which exhibits attraction being called Positive Electricity, and that which exhibits repulsion, Negative Electricity. Electricity, it is believed, is present more or less in all physical bodies, but usually in a quiescent state, through the two actions of it, attraction and repulsion, being equal and counterbalancing one another: for by proper means being used it can be aroused and then appear in a state of activity.

Whether there be any special sources of Electricity, and, if so, what causes arouse it to spread among the objects of Nature, is not known, but while all these possess a share of it, some contain it more abundantly than others, and hence are called Electrics. All objects are to some extent capable of allowing electricity to pass through them, from one end to the other, but some possess this property in greater degree than others, and hence are called Conductors: those objects which are good electrics being bad conductors, and those which are good conductors being bad electrics. If two bodies, free to move, like clouds floating in the atmosphere, be charged with the same sort of Electricity, whether Positive or Negative, they will not come within a certain distance of one another, because of a strong repulsion keeping them separate; but if with different sorts, they attract one another rapidly as soon as they come within a certain distance. If while one be well charged with electricity the other has much less, a portion from the former will pass to the latter, and this with an exhibition of a flash of light, being what is called lightning: the same thing occurring if clouds overcharged or undercharged floating near the earth approach a high hill.

The uses of Electricity in Nature are probably much greater than we as yet understand. It is in some way the cause, or one of the chief causes of atmospheric phenomena: especially of those which often occur suddenly, without apparent cause, and extend over immense districts of the earth's surface. Rapid changes of temperature, from genial to frost, and from frost to thaw; sudden outburst of storms or hurricanes of wind, with or without lightning, or rain, or hail, or snow, are probably struggles of Electricity to re-adjust the relative electric states of the atmosphere and the earth, which by some cause have become unbalanced. The modern discovery that storms blowing in squalls from ever-varying points of the compass are due to a rapid motion of the atmosphere in circles of immense diameter, and whose centres are travelling in some direction with considerable velocity, confirms this view: for of these cyclones the primary cause is, doubtless, electric agency. Electricity has a great effect on both plants and animals—a suitable measure benefiting, over much or over little injuring them—though whether it acts by stimulating the powers of life in organic beings, or by subjecting more fully the materials of which they are formed to the operation of that power is not known. Hence electric commotions when needed—and then only can they occur—are of immense advantage to all Nature: first, by equalizing the presence of electricity; secondly, by depriving the atmosphere of over much moisture through heavy falls of rain, hail, or snow; thirdly, by well mixing the air of different districts, so that what has been impure (by exhaustion of its oxygen in great cities and manufacturing towns, or by the exhalations of malaria in swamps and low-lying valleys) may be reinvigorated by the intermingling with it of that which is pure. As the mere contact of bodies differing in structure, temperature, or chemical character produces an electric action, though in a weak degree, it follows that while electric phenomena on the great scale are in Nature occasional only, they are, on the small scale, of unceasing occurrence.

The knowledge concerning this energetic force that men have acquired, forms the science of,
—Electricity: of which the branches are—
—Excitation;
—Attraction;
—Repulsion;
—Distribution;
—Induction;
—Transference;
—Mechanical and chemical effects;
—Production of heat and light.

The chief source from which men obtain Electricity, for scientific experiments and economic uses, or rather perhaps the means by which they have found that they can cause it to come into action, is friction between two bodies; some—the Electrics—yielding it more abundantly than others. Thus, glass rubbed with a woollen cloth gives off freely that sort of Electricity, or Electricity in that state which, for distinction sake, is called Positive or Vitreous Electricity. In like manner resin, when thus rubbed, gives off Electricity of that sort, or in that state which is called Negative or Resinous.

While this science is still of great use in connection with others, and in the examination of natural phenomena, its application to economic uses has been greatly superseded by Galvanism.

10. Galvanism, or Voltaic Electricity. This Physical Force has a near affinity with the one just spoken of, yet differs from it in several respects. 1. Its source, or the circumstance that arouses it into action, is not friction, but the decomposition by a chemical fluid of one metal while in contact with another. 2. The very low degree of activity in which it exists. 3. The very large quantity of this sort of electricity thus set in motion. 4. The continuity of the Voltaic current. The Galvanic fluid or power, like that of common Electricity, manifests itself as Positive and Negative, with the same rule as to Attraction and Repulsion between bodies under the influence of this power in its different or

similar states. It exhibits, under suitable circumstances, both light and heat, the former in a steady flame-like shape, not in flashing sparks; and the latter of greater intensity than can be otherwise produced.

Its uses in Nature, as distinct from those of Electricity, are not, as yet, much understood, but probably it operates largely in the decomposition of mineral masses containing metals, and in causing the latter to enter into new combinations.

The knowledge of this Physical Force that men have acquired, forms the science of,

—Galvanism, of which the branches are—

—Form of a Voltaic Pile;
—Action of its currents;
—Light and Heat;
—Effects in decomposition;
—Effects in recomposition;
—Medico-Galvanism.

Its uses to men have as yet been confined to four, but these of considerable importance. 1. The decomposition, and thereby the analysis of substances which had not been effected by the ordinary chemical means. 2. The coating of one metal with a film of another and more precious one, of a thinness far exceeding what could be obtained under the hammer. 3. The promoting of the functions of the human body. 4. The transmission of messages from one part of a country to another, or even from one country to another—in spite of intervening seas—in the course of a very few minutes; this last one, the sending of telegrams by telegraph wires, being an invention of immense utility, and one without which it would have been impossible to work railways with safety at the same speed, and without rashness with the same rapid succession of trains as now.

11. Magnetism. There is an iron ore, found crystallized, compact, and in grains like sand, which has the property of attracting iron filings, and causing them to adhere slightly to itself and to one another, as long as some of them are in contact with it. It is called Loadstone, properly Lodestone, because found chiefly in lodes or veins of iron ore. This quality is termed magnetic, and the power by which the

effect is produced is called Magnetism. If Iron be in contact with Loadstone, it becomes magnetic, but ceases to be so when separated from it; while if a piece of Steel be rubbed with a piece of Loadstone, it becomes permanently magnetic: that is, it does not lose the power of attraction after the operation ceases. If needles or small bars of steel be thus made magnetic, they possess the following properties. They attract iron filings at both ends, but not in the middle. If they are suspended by threads, or on pivots, one end of each always turns to the North, causing the other, of course, to turn to the South: hence the two ends are distinguished by the names of North Pole and South Pole. If two of these bars be brought near to one another, the north poles repel one another till each is far out of its proper direction, and the same is true of the south poles; but if the north pole of one be brought near the south pole of another, they attract one another, and cling together with a perceptible power. These results intimate that the magnetic force acts, like the electric and the galvanic forces, in the two modes of attraction and repulsion. If a magnetic needle be freely suspended, it not only points to the North, but also dips downwards towards a point (at present—for this point has shifted a good deal within the time of accurate observation), a little to the West of North, and a little below the surface of the earth: which point is believed to be a magnetic pole of the globe. The use of the Magnetic Force in Nature is not ascertained, but, like the Electric Force, it seems to be operating everywhere: the standing upright of a steel poker for some time without its being used, causes it to become slightly magnetic; as does also the striking of one not magnetic, with a smart blow of a hammer while poised in the hand, pointing northward and downward, roughly in the direction of the magnetic pole of the globe. It is supposed that the Aurora Borealis is an exhibition of Magnetic light: for Magnetism, like Electricity and Galvanism, produces light, and the Northern Lights sensibly affect the compass.

The knowledge of the law of Action, and of the effects of this curious Physical Force that men have acquired, forms the science of,

—Magnetism: the branches of which are—

—Facts and Principles;
—Laws of Action;
—Terrestial Magnetism;
—Theories of Magnetism;
—Formation of Magnets;
—Magnetic Instruments.

The chief use men have made of this power is in the formation of the compass for guidance in navigation, and in travelling over an unknown country; and for ascertaining accurately the bearings or direction of distant objects from an observer.

12. Electro-Magnetism. It has been found that Electricity (in its restricted sense) and Magnetism act and react one on the other in a great variety of different ways, according as the electrical conductor and the magnetic needle are in various positions with respect to one another; and also that, under particular circumstances, a Magnet can cause a body to become electrical, and that an Electric can cause a piece of iron or steel to become magnetic. The result being a conclusion, that either Electricity (in its generic sense) possesses a fourth mode of action, or that there is a fourth Physical Force nearly allied to Electricity, Galvanism, and Magnetism, and ever acting or ready to act contemporaneously with them. The service in Nature of this power or mode of action of electric currents is not yet understood.

The knowledge respecting the phenomena here referred to that men have acquired, forms the science of,

—Electro-Magnetism: of which the branches are—

—Law of its action;
—Its direct consequences;
—Rotatory Power;
—Concentration of effects;
—Electro-Magnetism of the Globe;
—Induction;
—Mutual action of currents;
—Theories regarding it;
—Thermo-Electricity;
—Photo-Electricity;
—Origin of Terrestial Magnetism.

The use made of this knowledge is as yet only the enlargement of the views of the Student of Nature respecting the complication of the action of the Physical Forces.

Minerals. One of the necessary consequences of the assumption that Light is used in this text as a family name for all the Physical Forces, and that they were on the First Day let loose on the masses of simple substances of which the globe then consisted, to rouse them by the energies of mechanical and chemical action, is the conclusion that (as already stated, p. 47) the more important compound substances, at least, were that day formed. The whole natural compounds now existing (excluding those formed by vegetable, animal, and human chemistry) are about 375, and of so many of these as were then formed, along with the 65 simple substances, the earth would consist at the close of the day. This thought should prompt us to consider briefly what Minerals are, with their use in Nature and in the arts.

Minerals mean Matter not organized into Plants or Animals: each simple mineral having its own qualities useful for certain purposes; each junction of two of these producing a substance with new qualities; when two or three compositions of the same two substances, but in different proportions to one another, are effected, each such compound has a quality differing to some extent from the others; when any compound substance admits another simple or another compound substance into chemical union with it, a new substance having its own properties is produced. So that if we were to notice, say 40 only of the simple substances, and suppose only 20 of these to combine with one another in dual and triple compositions, they would form a large number of substances different in their qualities one from another.

The use of these simple and compound substances in the economy of Nature is, to a large extent, patent and familiar to all: the mass of the earth is composed of them—the air, the sea, the soil, and the bodies of all living creatures, whether plants or animals.

The knowledge of Minerals that men have acquired, forms the Science of,

—Mineralogy: of which the branches are—

- —Natural history, or native places of Minerals;
- —Characteristic properties of each;
- —Analysis, or composition of each;
- —Physical and chemical qualities constituting their utility;

—Classification of in a Museum.

- —Earthy Minerals. 1. Of Quartz chiefly: Rock-crystal, Opal, Flint, Agate, Jasper, Garnet, Lapis Lazuli, &c. 2. Of Alumina chiefly: Corundum (Sapphire), Topaz, Ruby, Beryl, Emerald, &c.
- —Alkalino-Earthy Minerals. 1. Of Silex chiefly: Mica, Felspar, Talc, Basalt, Jade, Obsidian, Tourmaline, &c.
- —Acidiferous Earthy Minerals. 1. Of Lime chiefly: Carbonate of Lime, Marble, Chalk, Magnesian Limestone, Gypsum, &c. 2. Of Magnesia chiefly: Carbonate of Magnesia, &c. 3. Of Barytes chiefly: Heavy-spar, &c.
- —Acidiferous Alkaline Minerals. 1. Of Potash chiefly: Nitre. 2. Of Soda chiefly: Sulphate of Soda, Muriate of Soda (Common Salt), &c.
- —Acidiferous Alkalino-Earthy Minerals. 1. Of Alumina chiefly: Alum, &c.
- —Metals. Gold, Silver, Copper, Iron, Tin, Lead, Zinc, Manganese, Arsenic, Mercury, Platinum, &c.
- —Combustible Minerals. 1. Sulphur. 2. Of Carbon chiefly: Diamond, Mineral Oil, Bitumen, Black Coal, Jet, Amber, Mineral Resin.

The uses made of these and the other Minerals by men it would require a volume to narrate, and would moreover be superfluous.

THIRD: A GLEANING OF HINTS FROM GEN. I. 3-5, RESPECTING— 1. THE CHARACTER OF GOD; 2. THE RESPONSIBILITIES OF MAN; AND 3. THE SYMBOLISM OF THE OBJECTS AND PHENOMENA OF NATURE.

1. Hints respecting the character of God.

God said. It must be kept in remembrance that God here, and throughout the remainder of the history, save perhaps in ver. 26, means God the Son (though the mystery was not revealed to Moses and the house of Israel), *For whom are all things, and by whom are all things.* Col. i. 16; Heb. ii. 10. So that He who is the Word, having already the purpose of becoming in the fulness of time incarnate, in coming forth from God to prepare a sphere of action for the creature that was to be made in the likeness of God, chose to effect this by breathing words of the language, not of angels, but of men: for *Let there be light* are words of the language of men. Psa. xxxiii. 6; Prov. viii. 22–31.

He made, tried, and confirmed all creatures. When reading slowly, in a meditative mood, the statement that God created something, then saw that it was good, and, in some cases, superadded a blessing, the mind becomes forcibly impressed with this conclusion: that the creative power was put forth at the beginning of each day; that it took immediate effect, producing what was called for; that the Creator waited during the day watching the creature just brought into existence; and then, and not till then, after ascertaining that it was all He desired, He blest it. To bless a creature is to confirm it in its existence as created: for, whether it be an insentient or a sentient, or both a sentient and an intelligent creature, to bless it cannot signify less or more than to confirm to it its endowments for fulfilling the purpose of God. If this course of proceeding was followed, it seems to imply that the Creator, having already the purpose of becoming Man, to rule as Man all the creation which He should bring forth, fulfilled his creative intention in the way in which alone it is wise for men to act, namely, accomplishing a great work by stages, and at the end of each ascertaining that what is done has been well done, before proceeding further. This seems to be also the only answer that can be given to the question that starts up in every thoughtful soul, Why did not God create all things in one moment by one word, as doubtless He was well able to do? Ps. lxv. 9, 10; Heb. vi. 7.

2. Hints respecting the responsibilities of Men.

An illustration. If a few friends, of different measures of intelligence and education, were to meet together occasionally to read the Bible, on the understanding that whenever any words stirred their gratitude particularly, one of their number should, in turn, be called on to express their thanks to God, what would occur when they had read, *God said, Let there be light,* supposing the man of least knowledge were asked to offer prayer? Is it likely that he would do more than give thanks for the use of day-light to work by? Jno. xi. 9. But if one of the friends had lately been troubled with sore sickness, might he not probably suggest that the pleasant life-reviving cheerfulness of day-light (Psa. xxx. 5; Eccs. xi. 7) should be mentioned. Another, who was a farmer, might suggest that heat always attends on day-light, and that it is of vast importance to the crops, and should be acknowledged. Psa. xix. 6. Another, who was a gardener, might suggest that sun-light comprises chemical rays that are indispensable for maturing flowers, vegetables, and fruits (Deut. xxxiii. 13), and that this also should be remembered. Two others, a bleacher and a photographer, could back up the last proposal (Mark ix. 3); while a seventh, who was a mariner, might urge something as to the utility of the heavenly orbs in aiding him in the navigation of his vessel. (Acts xxvii. 20.) Would it not be well, then, if every reader of the text possessed all this knowledge of our indebtedness to God, arising out of natural things, that may be divided up amongst the members of such a supposed little assembly? To whatever extent any one is deficient in this, is he not to that extent ignorant concerning the goodness of God, and consequently deficient in gratitude to Him? What is true in respect to this text is true, in various degrees, in respect to all Scripture references to natural objects and phenomena.

Extensiveness of Man's responsibilities. The text before us, expounded as it has been in respect to the comprehensiveness of the term Light, overwhelms us with the sense of the responsibilities of Man.

—There are in nature Physical Forces—Attraction of four kinds, or having four modes of action; Light of four kinds, or having four modes of action; and Electricity of four kinds, or having four modes of action—which are in continual action, producing the phenomena with which we are surrounded. The alternations of day and night; the variations of the seasons producing the rest of winter, the buds of spring, the flowers of summer, and the fruits of autumn; and an endless succession of correlative effects in the earth, in the ocean, in the air, on plants, on animals, and on men, are unceasingly begun, carried on, and completed, entirely

or chiefly, by the unfailing energy of these appointed agents.
—These Physical Forces act according to invariable Laws: so that what, under certain circumstances, they accomplished in the beginning, the same, under similar circumstances, they will accomplish now.
—These Forces, and their law of action, do not exist by any necessity, nor by accident, nor by self-creation, nor by man's appointment.
—The many important services that they quietly, steadily, and unerringly fulfil in Nature, witness to the wisdom of Him who devised them, to the power of Him who created and upholds them, and to the goodness of Him who adapted them to the wants of his creatures.

God has permitted and enabled Man to discover much concerning the law of action of these Forces, and to apply the power of these Forces to his own use: To supply his bodily wants; to enlarge his understanding; to facilitate communication man with man; to promote his comprehension of some of the revelations made to him in the Bible; and to enable him to worship God more perfectly according to His will. For the existence of these Forces in Nature men should never cease to give thanks to God; for the benefit of the knowledge of these Forces arranged into the Sciences we have referred to, and extended into practical applications in many arts, man should never forget to give thanks to God; for the true and lawful use only of these sciences and arts men are ever responsible to God.

If men study these sciences, or if they practise any of these arts without being thereby all the more impelled to reverence and love God, they will be without excuse. Their knowledge and ingenuity will testify against them to their condemnation: for their sciences would be false, and their arts delusions, if God had not created these Physical Forces such as they are, or if He did not uphold them, or if He had been in character otherwise than that which He has revealed Himself to be.

The simple and compound substances. For the service in Nature of the 375 compound substances produced by the action of the Physical Forces (in addition to the 65 simple substances spoken of in the last Chapter), and for their use, in so far as that has been attained to in the arts, men have to thank God, and they ought to be ever in the spirit of doing so when they perceive them in the world around, notice them in museums, use them in workshops, or meet with reference to them in Scripture.

And there was light. Physical things obey God instantly and perfectly: no free will being granted to them because no intelligence is given. Men should as perfectly obey, though willingness is left to themselves to exercise: this being the ground of the superiority of their obedience, and of the consequent superiority of their reward. Psa. xxxiii. 9.

Day is the time for work. The Creator set men an example of working by day, of doing a good day's work, and at the close reviewing the result of his labours. Men should take heed to waste no time in idleness, or in evil work; and to be ever considering how much of the produce of their toil they and God can wish to be made permanent. Rev. xiv. 13.

Men, as God's work, will be judged. What God did in respect to judging the result of each day's work of creation, He has done, and will do also at the end of each stage or dispensation in the accomplishment of his purpose. He has blest the men found fit to be confirmed in their calling, and to be enabled to go forward with God in the development of a dispensation nearer to perfection. Matt. xxv. 21.

There is a type of Manhood. Men have discovered that a great many mineral substances (probably it is true of all) have each its peculiar form, structure, and appearance appointed to it, namely, that of its crystals: attaining in this state to a position of individuality emblematic of personality. They have observed further, that to attain its shape perfectly a substance must be pure in quality, and the circumstances attending its crystallization must be favourable: heterogeneous substances, or intrusive disturbances, hindering this perfection. Surely herein is a teaching to Men! No Christian can attain to that outward beauty of holiness

—consisting of action Godward and Manward—seen in Christ Jesus, which is his appointed characteristic, unless the purity of Christian consistency prevail within. All internal activities contradictory to membership in Christ, will hinder the perfect development of resemblance to Christ, the pattern crystal of manhood—so to speak. Matt. vi. 22; Luke ii. 52; Jno. i. 14.

3. Hints on the symbolism of the objects and phenomena of Nature.

First. Several of the spiritual truths symbolized by the Forces which, it is probable, came into action on the First Day, can be set forth, but doubless there are many others of which the Church is as yet ignorant: for the importance of this kind of knowledge has not been sufficiently realized, and therefore it has not been earnestly sought for from God.

Darkness. It was remarked, at page 19, that probably much more than absence of light was intimated when it was recorded that darkness prevailed over all the globe. It should suggest to us that the condition of the earth then was one of dark, cold, idle solitude, one that would have been evil, as being useless to God, if it had not been the appointed prelude to one the very opposite—that of ceaseless light (speaking of the globe as a whole). For in Scripture, Darkness is the symbol of ignorance of God's will; of the consequent non-fulfilment of it; and which is worse, of activity in opposition to, and therefore the frustrating of it for a season. But if so, the symbolic meaning began as soon as darkness began in reference to this earth, which was, before its creation, ordained to be a world of light for creatures of light. This figurative use of darkness in a sense larger than mere want of knowledge is seen in the words, *I create darkness, and create evil*, quoted above. Ps. cvii. 10; Col. i. 13.

Night. The portions of darkness separated by a decree from light, were designated by God as Night. Although it has its alleviating aspect, as the time of refreshing the body with rest, it must not be esteemed as goodly a portion of time as the day: for that were to set the inactivity of night-rest on a level with the activity of Sabbath rest. Night is appointed to be the time of discomfort through darkness, coldness, insecurity, and absence of pleasant sights and sounds: the time of idleness, save to wild beasts seeking what they may devour, and to evil men, hastening their own ruin by effecting the injury of others; the time when danger, sorrow, and other afflictions appear magnified, and this when there are few to protect, deliver, or offer consolation. Hence, Night is the symbol of periods when spiritual darkness covers the earth, and gross spiritual darkness a covenanted people; when the enemy is permitted for a season to delude and carry away captive those who have been wise in their own conceit, and strong in their self-confidence; when men pass through the valley of the shadow of death, and their privilege of serving God, as men, is suspended for a season. Ps. xxiii. 4; Jno. ix. 4; Rom. xiii. 12; Rev. xxii. 5.

Sunshine Light. Daylight in its general action is the symbol of the Truth in its operation, when ministered to men, on all the four parts of the soul. The figurative use of the term light is seen in the same Scripture already referred to,—*I form the light: I make peace.* Here not physical light merely is meant, for that is not the correlative of peace, but the revelation of God's will is: the proper fruit of which, the sure result of which where it is accepted, is peace on earth, goodwill among men. When we read the command uttered over chaos, *Let there be light,* we not only believe that light was, but we know it came not merely that it might exist, but to be the harbinger of a condition of light, and warmth, with the consequent activities of composition and decomposition among inorganic portions of matter, and of growth, labour, and enjoyment among all organized creatures. So, when the Truth is ministered in its fulness, it is adapted to effect, and if not resisted will produce in human society a similar condition of joyful prosperity. Is. ii. 5; xlii. 6; lx. 1; Jno. i. 9, 12.

Day. The periods of light separated from those of darkness were designated Day: hence in Scripture, Day is used as the symbol of time, place, or condition of a people, when, where, or in whom the Truth, or true knowledge, so prevails that they are children of the day, do the works of day, and are not afraid of the light. For Day is appointed to be the time of joy, through the shining of light, the circulation of warmth, the safety of moving about, and the pleasure excited by the cheerfulness of surrounding objects; the time of activity for domestic animals and for men: also, for the latter, of wise thought and useful labour; of social refreshing of the body and the mind; of feeding the hungry, clothing the naked, visiting the sick, and those who are in prison; and of offering worship unto Him who is the Author of all good, and the Lord of all creatures. Jno. xi. 9, 10; 1 Thess. v. 5.

Night and Day. These symbolic periods pass before men quickly, in unceasing succession, and their testimony is of great importance: for they speak of that period of darkness which shall never end, and of that Day of eternal life of which the beginning is the morning of the resurrection, but of which there shall be no termination. Ps. xix. 2.

Light. Light, in its prominent service of promoting vision in those who have eyes to see, is the symbol of Truth in its great action of infusing knowledge respecting spiritual realities into the human mind.

Light, we know, is given of God, whatever means He may use in distributing it: so Truth, we ought to know, comes from God alone, by whatever channel it reaches us. Hence, as light from Him is never darkness, so in like manner knowledge (in the true sense of the word) is never falsity or error. Jno. xii. 46.

Light was separated from darkness: so Truth was ordained to be distinct from error—and as light is the more esteemed after darkness: so knowledge is when contrasted with ignorance, or erroneous opinions. Therefore, as we cannot realize the inconveniences of night-time till day-light comes: so those only who attain to know the Truth ever come to understand fully the disadvantageousness and danger of wandering in error. John iii. 21.

Light may shine, but be unseen by one unfit, or be unused by one unwilling: so knowledge may be offered, but not perceived to be valuable by those lacking discernment, or, not accepted by those who dislike it. Jno. iii. 19, 20.

Light is not life, though it make life pleasant: so Truth is not spiritual life, though it aids that life to be useful. Jno. i. 4.

Light is not food to any animal, though it enables all to seek their food: so Truth is not food for the spiritual life, though it directs men where to obtain it. Jno. vi. 51.

Light of day is offered to every man, the sun rises on the just and the unjust, and every man shall answer for the use he has made of it: so He who is the Truth offers knowledge to all that come into the world—though not to all in equal measure. Ps. cxix. 142; Ro. ii. 14.

Light, in its white or undivided state, is most serviceable to nature, and most useful to men—thereby men see best how to do their work: so is the simple Truth, ministered to each man according to his need, most beneficial to him. But light, by the Divine Will, is capable of division for glory and for beauty, into seven colours (three primary and four secondary): which, in perfection, are exhibited before God and men in the rainbow; which, on a small scale, are examined by men in the prismatic spectrum; and which, in modified degrees, are displayed in different measures in the morning and evening clouds, daily throughout the year. So, surely, Truth is capable of being exhibited in a seven-fold beauty before God; when after being grafted in the souls of men, it comes forth both in word and act in response to Him that gave it. This, in the first place, and in the most perfect degree, was seen in Him who is the perfect man, wherefore, when He shewed Himself to John—*A rainbow was upon his head.* Rev. x. 1. For the perfect response in Christ Jesus to the will of God, forms a constant claim before the throne on high for the fulfilment of the covenant of mercy made with all creatures: for if God remembers his promise when He sees the bow in the cloud, how much more when He looks on the face of Him in whom, as a Man, He is altogether well pleased. Rev. iii. 1; v. 6. In accordance with this hint, that truth as well as light is not only for the use of men but for the gratification of God, by the exhibition of its seven-fold beauty before Him, was the ordinance of the seven golden lamps, kept burning in the Holy Place, not for use, as men count utility, but to give forth a glorious light as an act of worship before the Lord—the shadow of a better thing to come: the antitype of which, in word, is the utterance of the faith of the Body of Christ by the seven-fold Eldership in the shape of laudation and adoration; and, in deed, is the light of the life of the faithful—an exhibition of the beauty of the truth as distinct from its serviceableness in enlightening the understandings of men. Ex. xxvii. 20, 21; Matt. v. 16; Rev. i. 20.

Light, reflected from the objects around us, not only enables us to see them, but, it is supposed, causes us to see them of different colours according to the appointments in Nature: so the truth, shining forth in the life and conversation of our neighbours, not only enables us to perceive that they are Christians, but brethren of various gifts enabling them to shew forth the truth in a beautifully varied series of phases. It is true that some men, having grown up with little discernment of the heavenly glory of variety in unity, are apt to esteem as men of truth such only as having made the same attainments, and being of the same temperament, exhibit the same phase (or colour so to speak) of the truth as themselves. But, if in a well-stocked flower-garden men should hear a Romanist praising the red flowers, an Episcopalian praising the yellow flowers, and a Presbyterian praising the blue flowers, while each of them condemned all that were not of the colour he admired, would they not esteem the three persons to be mad, or, at least, to be unworthy of the privilege of entrance into such a paradise. Yet is not this how zealous sectarians are behaving themselves in the midst of the flower-garden of God? Gen. ii. 9; Is. li. 3; Ro. xii. 3.

Now Sun-light, as already stated, effects something more than the enabling of men to see. It is accompanied by other two, if not three, powers, as we have seen, which assist men, in many cases, in obtaining the desired fruit of their labour, and effect benefits for them in the objects of Nature far beyond all their comprehension. Is it not the same with the ministration of truth from Him who is the fountain thereof? Does the preached word merely enlighten that part of the soul called the mind? Is it not sent to excite the feelings, arouse the imagination, and mature the judgment? In short, to quicken all the powers of the soul into their proper activities. Jno. vi. 63.

Sunshine Heat. Heat, in its prominent service of producing warmth in the objects on which it impinges, is the symbol of the love of God in its operation of touching the hearts of men with the sense of his grace and favour, so that they become responsive to it by loving God. As heat comes with light (in its restricted sense), so does this grace accompany knowledge, but is distinct from it. As light does not produce warmth, but the heat that accompanies it effects this, so the same teaching about God's love that enlightens the understanding concerning it, does not necessarily kindle love in the heart of the hearer; but another phase of the truth moves the feelings—the powers of that region of the soul where love operates. Hence when the kingdom is preached, when Jesus is preached, there is a persuading of the heart as well as a convincing of the reason. Ro. v. 5.

Sunshine Actinism (Chemical Rays of light). It is probably emblematic of that power in the preached word that arouses the energy of the imagination: for is it not the imagination that causes the truth to be discerned to be something more than a light for the day? In like manner, those fourth rays in Sunshine not yet understood (if there be such) will probably turn out to be a power emblematic of that phase of truth which matures the judgment. But these two points are merely stated here as being suggested by analogy, and not as having been ascertained to be correct.

Attraction. Analogy suggests also for consideration—1. Whether Attraction of Cohesion be not the emblem of (as it certainly corresponds well with it) that drawing together (*with the cords of a man*, Hos. xi. 4) of the men in one locality to form a town, or of the Christian brethren to form a Congregation? 2. Whether Attraction of Affinity be not the emblem of the wise assembling (under God's providence) of a sufficient number of persons, and not too many, to form a congregation: comprising a suitable variety of members as to social standing and spiritual endowments—a fair slice of the

Christian community? 3. Whether Attraction of Crystallization be not the emblem of that power of edification which organizes a Congregation together into the perfect order: bishop, priests, deacons, and people, of suitable proportion as to number, for each class fulfilling the duties of its allotted place? 4. Whether Attraction of Gravitation be not the emblem of that catholic spirit which draws all Christian Congregations towards one another, and binds them together as the many portions of the one Body of Christ?

Electricity. Analogy suggests further for consideration, whether this Physical Force (without distinguishing at present its different sorts or varied modes of action) be not the emblem of that sensative sympathy that ought to thrill throughout the human race, and must be in active pulsation among Christian men if they be at all worthy of their calling; and which so closely resembles the nervous action in the human body, that the Apostle refers to the latter as the true symbol of the former (1 Cor. xii. 26): his illustration being founded on an ordained resemblance between the body of a man and the mystical Body of Christ. 1 Cor. xii. 12–27.

Second. The inorganic objects in Nature. If the assumption made be true, that all simple minerals—in number about 45—were created before the First Day, and that on that day all, or most of the compound inorganic substances now found—in number about 375—were formed by the operation of the Physical Forces, then this is the proper place for considering the symbolism of those compound substances whose representative characters are known, or plausibly conjectured. This suggests a task which, from its extent, and our lack of knowledge, cannot be here attempted: it must suffice to offer a few remarks to the end of shewing what a field of enquiry lies before men. It would be most natural to begin with Air, Water, and Earth, but as their symbolism arises less from the substances themselves than the phenomena with which they are connected, the consideration of them will be postponed—that of Air and Water—till after the work of the Second Day, and that of Earth till after the work of the Third Day, has been reviewed.

The symbolism which will be here traced out is that connected with—Colours; Precious Stones; and a few common substances.

I. Colours. That colours are symbolic is plain from special ones being called for by God to be used in the ornamentation of the Tabernacle, and from the mention of them in Scripture on various occasions, when, otherwise, colour would have been unimportant. Gen. ix. 13; Ex. xxv. 4; Is. liv. 11; Ezk. i. 4, 7, 16, 22; Rev. i. 14, xvii. 3, 4.

Colours being the exhibition of the pleasing properties of light, they are, when used symbolically, always intended to point specially to the beauty of the spiritual things referred to. Thus, when speaking of the symbolism of colour in reference to Truth (page 77), it was the beauty of the Truth theoretically, in a form of sound words, that was pointed at. Here, speaking of the same in reference to the conduct of men, it is the beauty of it as exhibited in their life and conversation that is pointed at. While presently, when speaking of the symbolism of coloured Gems, it will be the beauty of the Truth as exhibited by the diversified gifts of rule entrusted to those set as leaders over the people of God.

The rainbow suggests to us what the principal colours are—3 being evidently primary, 4 secondary—and Newton calculated that their proportions, forming a beautiful contrast and harmony, are:—Red 11, Orange 8, Yellow 14, Green 17, Blue 17, Indigo 11, and Violet 22 = 100 parts. For decorations inside houses, the proportions of the colours, to balance one another, so that none shall predominate, must be different, viz.:—Yellow 3, Red 5, Blue 7, = 15 parts; Orange 8, Green 10, Purple 12, = 30 parts—Total, 45 parts.

But though the striking colours of the rainbow are seven, the elementary scale of colours must of necessity comprise 12: 1, RED; 2, reddish Orange; 3, true Orange; 4, yellowish Orange; 5, YELLOW; 6, yellowish Green; 7, true Green; 8, bluish Green; 9, BLUE; 10, bluish Purple (Indigo); 11, true Purple; 12, reddish Purple (Violet). True Orange being that which appears to the eye to be a pure colour, neither reddish nor yellowish, is formed by the intermingling of Red and Yellow in the proportions of 5 to 3; true Green, the same by Yellow and Blue in the proportions of 3 to 7; and true Purple, the same, by Blue and Red in the proportions of 7 to 5.

The learned seem to find it difficult to determine the exact colours to which the Hebrew words refer, and think that the Hebrews, having no scientific knowledge of colours, had no clear conception of the differences between colours; and that this led to a want of precision in the language of the Old Testament. But the Israelities, who were by no means dull in their perception of the qualities and consequent utilities of visible things, must have been familiar with the seven colours of the rainbow, and able to compare therewith, to some extent, the colours of the natural and artificial objects around them; and also must have been acquainted with the knowledge of colours attained to by the Egyptians, who, like the Assyrians, made use of colouring matter in their temples and tombs, which exhibit to this day, Black, White, Red, Yellow, Blue, and Green: whether Orange, Purple, and Violet could be procured or produced by them is uncertain. It is probable, indeed, that the Hebrews did not distinguish between primary and secondary colours; and that they had no names to mark the very different tints of each colour: being perhaps satisfied with calling them bright or dull, light or dark.

A few remarks on the principal colours, those on each followed by a cogitation on its probable symbolism, are subjoined: treating of them in the following order:—Black, White, Red, Yellow, Blue, Orange, Green, Purple—with Indigo and Violet. The principles on which the symbolism will be attempted to be traced out are—1st. Light, though as a whole producing White, comprises parts which produce, each one when acting by itself, a peculiar colour: so Truth, though one and when acting as one producing perfection in the soul, comprises parts which produce, each one when acting by itself, a special quality in the soul of man—causing him, if any one of these prevail over the others, to manifest a corresponding peculiar character. 2d. As colours are an indication of, and an exhibition to the eye of the beauty of the effects of different parts of Light, so their anti-symbols must be indications of, and exhibitions to the moral sense of the beauty of the results of different portions of Truth.

1. Black. Although from a scientific point of view Black is the mere absence of light, and therefore of colour, it has ever been accounted to be a colour, and is as such used in a symbolic sense the next oftenest to White in Scripture. Hebrew words. 1. Kahdar, to be black, darkness, mourning, used 17 times (as in Jer. iv. 28; Joel ii. 10; Job xxx. 28); Khahshac, to be dark, or dim, 18 times; Khohshec, darkness, 78 times. 2. Ohphel, deeper darkness, used 9 times. In Job iii. 4–6. Khohshec is to obscure the day; but Ohphel, the night. 3. Khoom, soot-black, or, as soot is in the east, dirty-brown. Gen. xxx. 32. From a kindred word comes Khahn or Ham, the father of the dark-coloured race. N.B. In Scotland, koom is the name for soot. 4. Khehl'chah, black, wretched, unfortunate, Ps. x. 8, 10, 14. The deep poverty of spirit of the faithful, whom The Man of the earth will strive to destroy. 5. Chahmar, to grow warm, to be scorched, to grow black, 4 times. C'mahreem, blacks, is used in reference to idolatrous priests (2 Kings xxiii. 5; Hos. x. 5; Zeph. i. 4): probably they wore black robes instead of white ones—sackcloth instead of fine linen.

Black being produced by the absorption of light, might on first thoughts be supposed to be synonymous in symbolism with darkness—that is, the symbol of ignorance—but it is not so: perhaps for this reason, that darkness is not seen, though to one acquainted with light it is felt to exist, while black is seen, and may be contrasted with white or any other colour. Black, cheating the eye of its pleasure, is the symbol of adversity, physical or spiritual, depriving the heart of its enjoyment (Zech. vi. 2, 6; Rev. vi. 5); and of the mourning arising from such trouble.

Black is the fruit of darkness, so trouble is, directly or indirectly, the fruit of ignorance of God's will—whether it respects physical or spiritual things. Hence Black and its lighter tints become symbols of various measures of sorrow (unlovely symbols of unpleasant conditions) because of untoward events, and to be truly used the degree of blackness ought to correspond somewhat to the degree of mourning. 1. Full Black, black as deep as jet, is the token of irreparable evil, and of the sorrow unalleviated by hope produced thereby—in short, of despair: leaving no room for repentance, or supplication—the tongue made dumb. It is a token of such sorrow as arises from the death of friends, or condemnation of them leading to death or expatriation; or from the threatening of public calamities through plague, famine, or powerful enemies. Gen. xv. 12; Ps. xxxix. 9; Jer. iv. 28; Rev. vi. 12. The sackcloth and ashes of mourners have in extreme cases amounted to blackness, Ezk. iv. 1; Lam. ii. 10. 2. Tints blackish, or grey, are the tokens of sorrow alleviated, for while their use is a confession that trouble exists, and that deliverence has not yet come, they imply that the mourner mourns in hope: having faith in One who will deliver now or hereafter—who will make all things right or new. This is like the laying aside, for a season, of ornaments and beautiful garments, and to the ceasing from feasting and merriment. Ex. xxxiii. 5; Dan. x. 3. Deep black therefore seems unfit for Christians to use symbolically, either in civil apparel or ecclesiastical vestments.

2. White. Although it also, from a scientific point of view, is not a colour, yet White has always been esteemed as such, and is the one most frequently referred to in Scripture, in tints varying from blackish, grey, dull, pale, up to the most brilliant splendour, Ezk. viii. 2; and the supernatural glory of the Transfiguration, Matt. xvii. 2. Hebrew words. 1. Shesh. The common word used in connection with the Tabernacle, means simply White, though translated fine linen 33 times, marble twice, silk once, and blue once. The offerings called for in Ex. xxv. 4 were of some unnamed sort or sorts of raw material of four colours (whether naturally so, or dyed, is not indicated); which the women who were wise-hearted were to spin into yarn (xxxv. 25); which yarn the embroiderers and weavers—men of wisdom—were to make into fabrics (ver. 35); and the which fabrics are, in some places, all in common designated Moshzahr, apparently signifying textile fabrics. 2. Lahvahn, used 28 times, is always translated white; in Gen. xlix. 12, in reference to milk; in Ex. xvi. 31, to manna; in Lev. xiii. to the hair of the body in leprosy; in Zech. i. 5, to horses; and in several places to aged men, as being white or hoary. L'vohnah, frankincense, used 21 times, probably meant "the white gum." 3. Bootz, used 8 times,

at a later period in history, 1 Chron. iv. 21, &c., and translated fine linen, means White, though always applied to textures. In 1 Chron. xv. 27, the word declared that David wore a white robe, rather than that it was of linen.

White, though used by painters to imitate light, and by poets as an emblem of it, is not the symbol of Light, but as the former is the result of a full reflection of the latter, which is the symbol of the Truth, White becomes the symbol of the manifestation of the Truth in men: that is, of holiness. White, then, is the symbol of the state of holiness. Song v. 10; Dan. vii. 9; Lam. iv. 7; Mark ix. 3; Jno. xx. 12. In a secondary degree it is the symbol of legal righteousness: sometimes so used as to glance at the fact that in us it is a restored purity. Is. i. 18; Rev. vii. 14, xix. 8, 14. It is not impossible but that the difference between the full whiteness of unspotted innocence, and the sufficient whiteness of restored purity is pointed at by the expression made use of in Mark ix. 3, *So as no fuller on earth can white them.* The Lord's eternal purity never needed cleansing, while He has to employ spiritual fullers in the earth to *purify unto himself a peculiar people, zealous of good works*, Tit. ii. 14.

3. Red, Scarlet, Crimson. Words signifying red, of some tint, occur often in Scripture. Hebrew words. 1. Ahdohm, red, a natural colour, used 8 times; as in Gen. xxv. 30; 2 Kings iii. 22; Cant. v. 10; Is. lxiii. 2. Ahdam, to be red, used 10 times; as in Ex. xxv. to xxxix.; Lam. iv. 7; Is. i. 18. It indicates hues from true red to the reddish brown of heifers and horses. Admohnee, ruddy, 3 times; as in 1 Sam. xvi. 12. 2. Shahnee, bright-colour, 9 times, and translated scarlet: probably light red, but not likely to be our scarlet. Jos. ii. 18; 2 Sam. i. 24; Prov. xxxi. 21; Song iv. 3; Is. i. 18. 3. Tohlahghath shahnee, worm-bright-colour, 25 times; as in Ex. xxv. 4; and Sh'nee tohlaghath, bright-colour of the worm, 6 times; as in Lev. xiv. 4, are both translated scarlet. Probably this was the artificial bright red colour produced from the insect used for this purpose in ancient times, as cochineal is now. Tohlagh, worms, occurs in Ex. xvi. 20; and in Is. i. 18; and Lam. iv. 5, but is translated crimson in the former, and scarlet in the latter. Tohlehghah, a worm, used 6 times, as

in Job xxv. 6; and Ps. xxii. 6, was probably a caterpillar, and perhaps of a red colour. 4. Carmeel, crimson, 3 times, 2 Chr. ii. and iii. Carmeel takes the place in Temple colour of Tohlahgath shahnee in Tabernacle colour; as does Bootz the place of Shesh for white. 5. Shahshar, vermilion, twice, Jer. xxii. 14; Ezk. xxiii. 14. Scarlet, or crimson robes were worn by the luxurious, 2 Sam. i. 24; Jer. iv. 30; Lam. iv. 5; also by warriors, Nah. ii. 3: as by the officers of the Roman army, Matt. xxvii. 28.

Red, the colour of blood (scarlet at first, but soon dimmed to crimson), and of the rays of the solar spectrum that contain the greatest power of causing heat, is therefore, probably, the symbol of spiritual life, as indicated in its chief energy, the manifestation of Love. Physical and spiritual health have a certain resemblance and ought to go together (3 Jno. ver. 2): correspondingly, as a ruddy complexion is a pleasing token of health—*For the life of the flesh is in the blood,* Lev. xvii. 11 —implying strength, and activity in using it (1 Sam. (xvi. 12), so Red is the symbol of that pleasing token of spiritual health, the exhibition of good works as the fruit of Love—one of the beauties of holiness. If so, the colour of Scarlet, called for to be used in ornamenting the Tabernacle, symbolized the beauty of the manifestation of Love: for as the Church praises the exhibition of purity and beneficence in the Bridegroom (Song v. 10), so would He have the same beauty in the Bride. In a secondary sense, Red may be the emblem of headship (Ex. xxv. 5)—which is one of the exhibitions of love; of enjoyment of life (Prov. xxxi. 21)—for where there is no love there is no joy; and, by perversion in the contrary sense, of a threat to pour out blood—to extinguish life—as by a red flag; or the red garments of warriors, Is. lxiii. 1. Probably the scarlet of the woman and of the beast (Rev. xvii. 3) is emblematic of the energies of the natural life, manifested in evil love for the ecclesiastical system referred to, and for the civil systems that sustain it.

4. Yellow. It is supposed by some, that the Hebrew language had no word really referring to this colour, and that though in our translation of the Bible it occurs in a few places, in all or some of these it meant Green or Greenish, Lev. xiii. 49;

Ps. lxviii. 13. It is, however, the most powerful of all colours: that is, if equal spots of bright colours were before one, the Yellow spot would attract most attention. It is therefore strange, indeed, if it really is not frequently referred to in the Bible, especially in the poetry, though our translation does not give it. Hebrew words. 1. Tzahhohv, yellow, used in Lev. xiii. 30, 32, 36, as the colour of the hair of the head or beard in cases of leprosy. It is probably golden-yellow, as Zahhar is one of the names of Gold. Prov. xxv. 11. Zahhahr, used in the Tabernacle (Ex. xxxiii., &c.), was gold wire, not yellow thread. Ex. xxxix. 3. 2. Khahrootz, gold, is used Ps. lxviii. 13 for gold colour: Khahrootz y'rakrak, being gold greenish, or colour changing from yellow to green.

Bright sunshine lights up the landscape, and bathes it with an enriching yet mellowing tint of golden yellow; and in the solar spectrum it is the yellow space that comprises the chief portion of the light, causing it to shine out conspicuously. These considerations suggest that Yellow may probably be the symbol of the beauty of the manifestation of Faith: comprehending clearly the Lord's commands, and grasping steadily the promises of God, until the phantom-like anticipations of their fulfilment become solid realities of present comfort. Is. lxi. 10; 2 Cor. vi. 10; Phil. iv. 4; Heb. xi. 1.

5. Blue. T'chehleth occurs 48 times, and is always translated Blue. It was understood by some of the Fathers to signify hyacinthine, or dusky ferruginous red; but Josephus asserts that it is the tint of the heavens, that is, the deep blue of the eastern sky. There need be no doubt that he is right: for as this tint must, of course, have been familiar to the Israelites, as to all nations, they must have had a name for it.

If any one looks steadily up into the vault of heaven for some little while on a fine day, and considers what impression the blue colour thereof makes on his mind and feelings, he will have a clear discernment that it is that of pure, cool, unruffled, dignified exaltation: suggesting that the blue sky, though connected with the globe, is not affected by sublunary phenomena, or worldly events, and is more of the heavens than of the earth. This guides to the conclusion that Blue is the symbol of the beauty of Hope—that calm phase of heavenly-mindedness which is produced by simple confidence in God: diminishing the threatening aspect of inopportune events, and increasing the certainty of all the promises; uplifting the souls of men, while still in mortal bodies, and engaged in earthly affairs, to contemplate with steady gaze and dispassionate judgment things past, present, and to come—the condition referred to in the following texts: Luke xxi. 19; Jno. xvii. 16; Ro. viii. 24, 25; Phil. iii. 13–20; Col. iii. 1. Blue colour was called for to be used in the ornamentation of the Tabernacle (Ex. xxv. 4) as a symbol, doubtless, of that heavenly-mindedness of hopeful confidence in God that must characterize the members which are to form the Church of Christ, and exhibit all the beauties of his holiness. A ribbon of Blue was ordered to be drawn through the fringes of the garments of the people of Israel (Numb. xv. 38) to keep them in mind of the commandments of Him who dwells in the heavens, that so they might not become as the nations of the world, following their own fleshly wills, and occupied wholly with earthly things.

6. Orange. This colour, arising from red and yellow being placed side by side, or mixed together (in the proportions of 5 to 3), is a secondary or compound colour. It is common in nature and very striking, contrasting strongly with others. To suppose, therefore, that the Israelites did not distinguish between it and red on the one hand, or yellowish green on the other, must surely be a mistake. Whether they had a special name for it, or not, is a different matter, but, if not, they could not well avoid having a compound one, such as yellow-red or red-yellow: though perhaps there was no need for the word occurring in the Scriptures.

Orange suggests to the mind's eye the idea of red and yellow matured into a softened ripeness, and is therefore apparently the symbol of the beauty of the joint fruit of Love and Faith, of the manifestation of that condition of soul wherein faith worketh by love (Gal. v. 6): being that heavenly obedience which comprises an intelligent apprehension of and hearty concurrence in the will of God. Ex. xix. 5; 1 Sam. xv. 22; Ps. ciii. 20.

7. Green. This colour, being a compound of yellow and blue (in the proportions of 3 to 7), is a secondary or compound colour. It is very common in nature, and frequently referred to in Scripture. Green is used in many places rather to indicate the symbolism of some vegetable phenomenon connected with greenness, than in reference to the colour. Hebrew words. 1. Yahrak, greens or herbs, used 5 times; as in Prov. xv. 17. Yehrek, green, of herbs, 6 times; as in Gen. i. 30. Y'rakrak, 3 times, and Yehrahkohn, 6 times, are both diminutives signifying greenish; as in Ps. lxviii. 13; Deut. xxviii. 22—the latter being translated mildew. 2. Raghanahn, green, of trees, 19 times; as in Ps. xxxvii. 35—but in Ps. xcii. 10, it is translated fresh, and in ver. 14, flourishing.

Green suggests to the mind's eye the future harvest, and other useful results of vegetation (Ps. lxv. 10–13), and is therefore, apparently, the symbol of the beauty of the joint fruit of Faith and Hope, of the manifestation of an intelligent expectation of the fulfilment of the promises of God (2 Cor. i. 20; 2 Pet. i. 16): being the anticipatory utterance of grateful praise to the Giver of all good in due season. Ps. xxiii. 2, lii. 8.

8. Purple: with Indigo and Violet colours. These terms have been used by modern authors in a rather indiscriminate manner: it therefore seems to be justifiable to attempt to clear up the matter—if possible.

Purple. Heb. Argahmahn, used 36 times, as the colour of textures; as in Ex. xxv.–xxxix. Greek, Porphyra. Both Hebrews and Greeks sometimes used the word to signify indefinitely a glorious colour, but when used definitely, it referred to the deep red or dark crimson colour (like that of coagulated blood) which was produced by the liquor of the shell-fish, Mürex purpura. This being obtainable in small quantities only, robes dyed with it were not procurable save by kings, Jud. viii. 26; or chief officers, civil or religious, Dan. v. 7, 16, 29—where scarlet should be purple—Mark xv. 17, 20; Jno. xix. 2, 5; or the wealthy, Jer. x. 9; Ezk. xxvii. 7; Luke xvi. 19; Rev. xvii. 4, xviii. 16. Purple, arising from the mixture of red and blue (in the proportions of 5 to 7), is a secondary or compound colour. It has been described as being the most sublime of all colours, having the gorgeousness of red, softened by the gravity of the blue. This dignity in the colour well fitted it to characterise the robes of kings and those set in authority under them (*third ruler in the kingdom*, Dan. v. 29), and this by natural instinct has been perceived by various nations, so that "The Purple" has become a metaphor for dignity of position.

Purple, being composed of red and blue, is, apparently, the symbol of the beauty of the joint fruit of Love and Hope, of the manifestation of that condition of soul attained to by the man who, loving the expectation of the things set before him, is uplifted, in the midst of the sons of men, above the seduction of things that are seen, and above the entanglement of the contentions among the potsherds of the earth (Jno. xvii. 15; 1 Pet. ii. 9–12): being the dignified deportment becoming a Christian man, not through any false puffings up leading to forgetfulness that he is still a creature, and dependent on the Creator: but, on the contrary, through being hopeful of walking worthy of his vocation because he is thereunto called of God. The Purple colour ordered to be used in the ornamentation of the Tabernacle, was doubtless to be a symbol of that royal dignity, in feeling and deportment, which should in every word and act characterise those who even now are the sons of God, and are being prepared to be kings and priests, and as such to reign with Christ on the earth. Eph. iv. 1; Ph. ii. 15; Col. iii. 1–4; 1 Jno. iii. 2; Rev. v. 10.

9, 10. Indigo, Violet. In the rainbow (as also in the solar spectrum) the Purple is divided into two tints, a bluish Purple, commonly called Indigo colour, and a reddish Purple, usually called Violet colour. Why this secondary colour should be thus separated into two very distinct tints, while Orange and Green are not so clearly divided, has not been revealed, and men's cogitations have as yet failed to divine the reason. If on one side of a piece of true Purple, a strip of bluish Purple be placed, and a strip of reddish Purple on the other, the eye immediately becomes impressed with the sense that the one is dark or dull Purple, and the other light or bright Purple. If these tints of Purple have each a phase of symbolic meaning of its own, probably this contrast is the clue to it: the dark Purple probably pointing more to the inward sense of the dignity of our high calling in Christ Jesus; and the bright Purple pointing more to the outward witness to the same, exhibited in that light of Christian life and conversation which even uninstructed men can appreciate, and be led to glorify God because of it. Matt. v. 16.

If these cogitations have the germs of truth in them, the symbolism of colour, so far, stands thus:
—Black, of the unloveliness of mourning, though it be proper, because of the evils that are in the world, as the consequence of sin still existing.
—White, of the beauty of holiness—even of that which is legal merely, through the imputation of the righteousness of Christ, but much more of that which is real; through the impartation of the same.
—Red, of the beauty of the activity of Love in the accomplishment of good works.
—Orange, of the beauty of the obedience which comprises both an intelligent knowledge of, and a hearty concurrence in the will of God.
—Yellow, of the beauty of the energy of Faith manifested in contending for the Truth and in grasping the promises of God.
—Green, of the beauty of intelligent hope, with its fruit of grateful praise to Him who will fulfil every promise He has made.—Blue, of the beauty of Hope as an enduring confidence in God.
—Purple, of the beauty of the deportment that is based on a sense of the dignity of our high calling in Christ: the bluish Purple, of the inward realization of this; the reddish Purple, of the suitable exhibition of the same.

II. Gems, or Precious Stones. There are found in Nature, small pieces of stone so pleasing to the human eye, that they have ever been highly prized in all nations: especially as they are not to be obtained in such quantities as to make them common. While they rival the most beautiful productions of the vegetable and animal kingdom, they excel all such in this respect that their beauty is permanent; and in addition, many of them are very suitable for being engraved on, and thereby become as signet rings doubly precious. They are called gems or "eyes," from their being, for the most part, full of light like the human eye.

The super-physical qualities imputed to these stones, and the emblematic use of their names by poets of all ages, shew their fitness to be symbols, while their being employed in God's service in the Tabernacle, and the Temple, put it beyond doubt that they were ordained to be symbols of spiritual qualities. If Moses had been directed to engrave the names of the Tribes on two hard stones, and place them on the shoulders of the High-priest, and to engrave the same names on twelve coloured stones, and insert them in the Breastplate, it might have been supposed it was for utility sake in the first case, and for ornament sake merely in the second. But when special stones are mentioned, and their order in the Breastplate is prescribed, symbolic use is plainly indicated: this conclusion being confirmed by the references to all or some of these stones in subsequent prophecies, more especially in that respecting the foundations of the New Jerusalem. Ex. xxviii. 9, 17–21; Song v. 14; Is. liv. 11, 12; Lam. iv. 7; Ezk. i. 22, 26; Rev. iv. 3, xxi. 10–21.

When God commanded Moses to insert twelve stones, by name, in the Pectoral, they must have been such as the latter was acquainted with, and such as the Israelities had among them: borrowed, most probably, from the Egyptians, and, if so, such as were well known in Egypt. It is a matter of much interest to know positively which of the gems these were, because doubtless each stone was in its physical qualities a symbol of the social quality that did or ought to have characterized the Patriarch and the Tribe whose name it bore; and consequently the spiritual characteristic of the corresponding Leader and Tribe of the spiritual Israel, the Church of Christ: for, looking on true specimens of them might facilitate the discerning of the symbolism of each, or, at least, preserve from foolish conclusions concerning them. But although much learning has been exercised on the question, the result is very unsatisfactory: probably because too much accuracy has been attempted. The names even in the Greek of the Septuagint, and in the Latin of the Vulgate, are in several cases very doubtfully supposed to refer to gems that bear a similar name now: no wonder, therefore, if the Hebrew names be more uncertainly connected with them.

There can be no question, but that the ancients esteemed precious stones because of their translucency, or reflection of light, or colour, or hardness that bore a high polish, or tough-hardness that fitted them for being engraved, and for being much used as signets. They had no knowledge of the constituent elements of these minerals, and therefore could not arrange them into genera and species, as moderns do, but simply into classes and varieties, according to their visible qualities. Probably—1. Transparent stones—Colourless, or Red, Yellow, Blue, &c. 2. Scintillant stones—of same varieties. 5. Semi-transparent or translucent stones—of the same varieties. 4. Opaque stones—of the same varieties, or variegated. 5. Signet stones—out of all these classes. In this way stones of different component parts would be sorted together in one class, though as their similar qualities would be finer in some than in others (because of their chemical differences), they would be distinguished from the rest by the practised eye, and obtain among those familiar with such things designations of praise, such as, fine, choice, perfect—perhaps oriental—while known by the same common name applied to all qualities. For example, transparent colourless crystals of Quartz (Rock Crystal), of Corundum (Sapphire), of Topaz, of Beryl, of carbonate of Lime, of fluate of Lime, of sulphate of Lime, of sulphate of Barytes, of muriate of Soda (Salt), of Carbon (Diamond), have a measure of outward resemblance, and might, by the uninitiated, be mistaken for one another. On the other hand, various gems are found of more than one colour, as for example, Sapphires occur colourless, blue, violet or amethystine, yellow, green, and opalescent: being therefore to some extent represented by similarly coloured crystals of any of the other minerals just mentioned. That the stones to be used in the High-priest's vestments were to be of good quality, of the class and colour indicated by name, there can be no doubt, but the name then used did, most probably, not point to all the varieties of the substance ascertained by modern Mineralogy to exist.

A series of the names of precious stones—*glistering stones and of diverse colours*, as David calls them, 2 Chron. xxix. 3; and *pleasant stones*, as Isaiah calls them, Is. liv. 12—occurs twice in Scripture (not noticing here the riches of the King of Tyrus, Ezk. xxviii. 13), as set in the Breastplate, and as forming the foundations of the New Jerusalem: being doubtless the same stones, though not in the same order. The Septuagint and Josephus (Ant. iii., cap. vii., sec. 5), agree as to the translation of the names in the first series (though the places of three of them differ): consequently their list is, by some, considered to be the best. The three Chaldee Targums on Ex. xxviii. give three sets of names to these stones, which Etheridge, in his translation, has quoted along with the Hebrew ones. But as the names are not only diverse, but given in different order, they do not apparently afford any assistance. It is useful, for obvious reasons, to have the first named lists before us, divided into rows, in the following cogitations upon them.

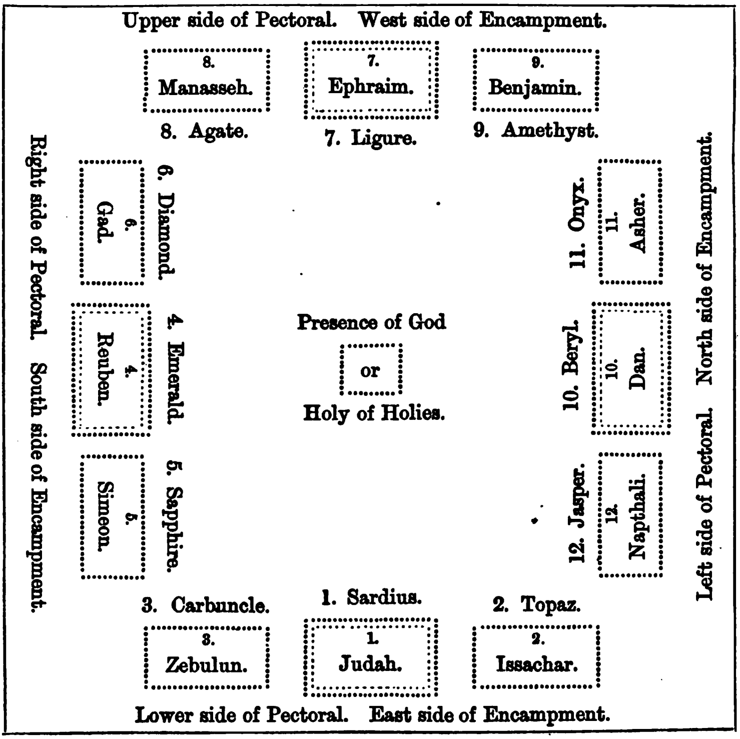
Names of the Stones, and the order in which the Tribes were marshalled.

Ex. xxviii. 17. A. V.	Ex. xxviii. 17. Septuagint.	Ex. xxviii. 17. Josephus.	Order of the Tribes.	Rev. xxi. 19. Foundations.
1. Sardius.	Sardius.	Sardonyx.	Judah.	Jasper.
2. Topaz.	Topaz.	Topaz.	Issachar.	Sapphire.
3. Carbuncle.	Emerald.	Emerald.	Zebulun.	Chalcedony.
4. Emerald.	Carbuncle.	Carbuncle.	Reuben.	Emerald.
5. Sapphire.	Sapphire.	Jasper.	Simeon.	Sardonyx.
6, Diamond.	Jasper.	Sapphire.	Gad.	Sardius.
7. Ligure.	Ligure.	Ligure.	Ephraim.	Chrysolite.
8. Agate.	Agate.	Amethyst.	Manasseh.	Beryl.
9. Amethyst.	Amethyst.	Agate.	Benjamin.	Topaz.
10. Beryl.	Chrysolite.	Chrysolite.	Dan.	Chrysoprasus.
11. Onyx.	Beryl.	Onyx.	Asher.	Jacinth.
12. Jasper.	Onyx.	Beryl.	Naphtali.	Amethyst.

The only difference, besides the order in which the names are placed, between the names of the first and second columns is that in the former, Diamond, and in the latter, Chrysolite appears. The difference between the names of the first and last column is greater: the former having Carbuncle, Diamond, Ligure, Agate, and Onyx—the latter having Chalcedony, Sardonyx, Chrysolite, Chrysoprasus, and Jacinth. But probably Diamond should be Chrysolite; and Ligure is the same as Jacinth; Agate as Chalcedony; and Onyx as Sardonyx: leaving Carbuncle and Chrysoprasus only without correspondence.

The order in which these stones were placed in the Pectoral, and the order in which the names of the Tribes were engraved on them, not being mentioned in the Bible, are uncertain: yet a little consideration of the matter establishes a probability concerning this arrangement. The Palestine and the Jerusalem Targums profess to tell on which stone each name was cut; but they do not agree on this point, and, besides, assert that the names Levi and Joseph were used when at the time God was separating Levi from being a Tribe, and had long before enlarged Joseph into Ephraim and Manasseh. The names on the Onyx stones of the shoulder-pieces, and on the gems of the Breastplate, were not those of the children of Jacob, but of the children of Israel—*every one with his name shall they be according to the twelve tribes.* Ex. xxxix. 14. Now the Tribes were ordered to encamp around the Tabernacle, in the presence of God, and to go forth during their marches, following the Angel of the Lord, in the following order, and it stands to reason, almost, that the stones bearing the names of the Tribes should be so arranged in the Pectoral, on the heart of Aaron before God, as to preserve the same order as that in which the Tribes themselves were commanded to appear before Him. That is, a row of three along each side of the square breastplate, leaving the centre unoccupied, where probably the presence of God was to be understood to abide. Some words of the Palestine Targum, so far as they are worth anything, go to confirm this view. "And thou shalt fill it with a fulness of precious stones: four rows of precious gems, answering to the four regions of the world." The following was the appointed order of the encampment. Judah's camp on the east side around his standard, bearing, as Jewish tradition records, a representation of a lion's whelp, with this motto, *Rise up, Lord, and let thine enemies be scattered; and let them that hate* *thee flee before thee.* Num. x. 35. 1. Judah; 2. Issachar; 3. Zebulun. Reuben's camp on the south around his standard, bearing the representation of a young hart, with this motto, *Hear, O Israel: the Lord our God is one Lord.* Deut. vi. 4. 4. Reuben; 5. Simeon; 6. Gad. Ephraim's camp on the west around his standard, bearing the representation of a child, with this motto, *And the cloud of the Lord was upon them by day, when they went out of the camp.* Num. x. 34. 7. Ephraim; 8. Manasseh; 9. Benjamin. Dan's camp on the north around his standard, bearing the representation of a serpent or arrow snake, with this motto, *And when it rested, he said, Return, O Lord, unto the many thousands of Israel.* Num. x. 36. 10. Dan; 11. Asher; 12. Naphtali. Num. ii.

The arrangement of the stones on the Pectoral, and the encampment of the Tribes, may, on this assumption, be represented by one diagram.



The principal Tribe in each camp is here placed in the middle, as it is presumable it would be, but, whether or not, this does not affect the allocation of the names to the stones, as the same course of recounting them would, no doubt, be followed in either case.

A few cogitations on the stones in the first column of the Table, and on their connection with the Tribes of the literal and spiritual Israel, will be here recorded: being more for the purpose of shewing what might be done if we knew certainly the gems referred to, and the name of the Tribe engraven on each, than in the expectation that what is written as a tentative sketch will prove to be correct.

1. Sardius. Heb. Ohdem; Greek, Sardion. Mentioned in Ex. xxviii. 17, xxxix. 10; Ezk. xxviii. 13; Rev. xxi. 20—where it is the sixth of the series. It is said to have been a rich red stone, probably the variety of oriental chalcedony, called red Carnelian from its resemblance to flesh, and which is feebly translucent, exhibiting the colour of blood. If so, it was a Silex mineral, its beauty constituted by the soft brightness of its colour, and its value greatly increased by its suitability—from its being tough as well as moderately hard—for laborious cutting: most of the finer works of the ancient engravers having been executed in Carnelian.

If this may be accepted as correct, and if we may assume that on it the name of Judah (Praise, Gen. xxix. 35—see also his blessings, Gen. xlix. 8-12; Deut. xxxiii. 7) was engraved, the Sardius pointed, perhaps, to the abiding beauty of the rule of love, *i.e.* the rule of God (see Red, p. 86): a symbolism confirmed by a signet having been the emblem of rule in ancient times. 1 Kings xxi. 8; Dan. vi. 16; Hag. ii. 23. For this seems to be the characteristic of Judah (Gen. xlix. 10), and of Him who is likened unto a Sardine stone. Rev. iv. 3. Hence England may be the corresponding Christian Tribe: for the exercise of, and submission to reasonable rule is its characteristic.

2. Topaz—the yellowish-green variety. Heb. Pitdah; Greek, Topazion. Mentioned in Ex. xxviii. 17, xxxix. 10; Job xxviii. 19; Ezk. xxviii. 13; Rev. xxi. 10—where it is the

ninth of the series. It is said to have been a semi-transparent, pale dead-green coloured stone, with a mixture of yellow; hard, and taking on a good polish—an Alumine mineral, in composition approximating to Sapphire and Ruby. Topazes are of other colours, namely, yellow, blue, lilac, and red, but were at that time probably not known by the same name. (It is supposed that the Topazion of the Greeks referred to what is now called Chrysolite, a silicate of Magnesia, and that what they called Chrysolite was a yellow Sapphire, or yellow Topaz: see Chrysolite—6).

If this may be accepted as correct, and if we may assume that on it the name of Issachar (Hire, Gen. xxx. 18—see also his blessings, Gen. xlix. 14, 15; Deut. xxxiii. 18) was engraved, this variety of Topaz pointed, perhaps, to the abiding beauty of the submissive dependence of creatures, which, resting on the promises of God, yields a measure of obedience that helps to complete the acknowledgment of Him: for, *The princes of Issacher were with Deborah.* Jud. v. 15. Hence Denmark and Holland may correspond to Issachar: for contented industry is their characteristic.

3. Carbuncle—probably No. 4, as in Sept. Heb. Bahrehketh; Greek, Anthrax. Mentioned in Ex. xxviii. 17, xxxix. 10; Ezk. xxviii. 13. It is fourth in the series in the Septuagint, and does not occur apparently in Rev. xxi. It is said to have been a fiery-red stone, like red-hot charcoal: whence its Hebrew name is from "to flash," and its Greek one signifies, coal. Mineralogists suppose it was what is now called Almandine or Precious Garnet, a beautiful transparent gem of various shades of red, often tinged with yellow or blue, and hence sometimes of a reddish violet colour—a Silico-alumine mineral.

If this may be accepted as correct, and if we are to assume, as the order of the Hebrew series suggests, that on it the name of Zebulun was engraved, the Carbuncle does not seem to point to anything that can be supposed to be characteristic of that Tribe. But if, following the Septuagint order of names, we may assume that the Carbuncle was the fourth stone, and that consequently on it was engraved the name of Reuben (Who sees the son, Gen. xxix. 32—see also his blessings, Gen. xlix. 3, 4; Deut. xxxiii. 6) was engraved, then we may suppose that its physical character pointed to the abiding beauty of the zealous energy of brotherly love. Hence Austria (as the historical head of Germany) is perhaps the corresponding Tribe: an intense desire for a united Fatherland being the characteristic of Germany.

4. Emerald—probably No. 3, as in the Sept. Heb. Nohphec; Greek, Smaragdos. Mentioned in Ex. xxviii. 18, xxxix. 11; Ezk. xvii. 16, xxviii. 13; Rev. xxi. 19—where it is the fourth in the series, while it is third in that of the Septuagint. It is said to have been a transparent, pure bright-green coloured stone—a Zircon mineral, allied to the Beryl. It was highly esteemed from its green refreshing the eye. The green coloured Sapphire is called Oriental Emerald, and some think this was the stone meant to be inserted in the Pectoral: however that may be, according to the remarks, p. 93, Green Sapphires, Beryls, and Emeralds would be classed together as one sort of stone at that period.

If this may be accepted as correct, and if we are to assume, as the order of the Hebrew series suggests, that on it the name of Reuben was engraved, the Emerald does not seem to point to anything that we can suppose to have been a characteristic of that Tribe. But if, following the Septuagint order of names, we may assume that the Emerald was the third stone, and that consequently on it was engraved the name of Zebulun (Dwelling, Gen. xxx. 20—see also his blessings, Gen. xlix. 13; Deut. xxiii. 18, 19) was engraved, then we may suppose that its physical characters pointed to the abiding beauty of the contentment of intelligent hope quietly waiting for the enjoyment of the blessings of God expressed in the words—"*For they shall suck of the abundance of the seas, and of treasures hid in the sand.*" Hence Greece perhaps is the corresponding Tribe: for a capacity for intellectual and bodily enjoyment seems to be its characteristic.

5. Sapphire—the azure variety. Heb. Sappeer; Greek, Sappheiros. Mentioned in Ex. xxiv. 10 (as the body of heaven in its clearness), xxviii. 18, xxxix. 11; Job xxviii. 6, 16; Song v. 14; Is. liv. 11; Lam. iv. 7; Ezk. i. 26, x. 1, xxviii. 13; Rev.

xxi. 19—where it is the second of the series. It is said to have been a transparent, pure azure-blue coloured stone—sometimes with minute gold coloured spots, which increased its value—an Alumine mineral, being, with the Ruby, Corundum in its perfect state. The blue is only one of the varieties of Sapphire, but to it, in ancient times, the name seems to have been restricted. This gem is next to the Diamond in lustre, hardness, and value. Pliny, when professing to describe Sapphire, gives a good description of Lapis Lazuli, hence some have thought the latter was the stone of the Pectoral, but it is more likely that there was a misapplication of the name in the writings of the Roman naturalist.

If this be accepted as correct, and if we may assume that on it the name of Simeon (Heard, Gen. xxix. 33—see also his blessing, Gen. xlix. 5–7) was engraved, the Sapphire pointed, perhaps, to the abiding beauty of hope through confidence in God. Hence Prussia may be the corresponding Tribe: for a quiet perseverance in accomplishing what is aimed at, is the characteristic of North Germany.

6. Diamond—or Chrysolite? Heb. Jahhalohm. Mentioned in Ex. xxviii. 18, xxxix. 11; Ezk. xxviii. 13. Also Heb. Sh'meer, and Shameer, translated Diamond in Jer. xvii. 1, and Adamant in Ezk. iii. 9; and Zech. vii. 12. It does not occur in Rev. xxi., or in the Septuagint which states Jasper, or in Josephus who states Sapphire to be the sixth stone: neither of these being eligible as a substitute for Diamond, inasmuch as the former is the twelfth stone in the Hebrew list, and the latter is the fifth, and has just been considered. As the opinion of the learned is opposed to the translation of Jahhalohm by Diamond, the consideration of it will not be pursued now, but resorted to afterwards (p. 106), and in its place Chrysolite, the one stone in the list of the Septuagint and of Josephus that is not mentioned in the A. V. list, will be substituted, and pondered on here: encouragement so to do arising from this gem being named among the foundation stones in Rev. xxi. 20.

Chrysolite. Here assumed to be referred to by the Heb. Jahhalohm; Ex. xxviii. 18, xxix. 11; Ezk. xxviii. 13; Greek, Chrysolithos, Rev. xxi. 20. It is said to have been a transparent, golden-yellow coloured stone—whence its name. It was, most likely (see p. 98), either a yellow Sapphire or a yellow Topaz—the former being often called an Oriental Topaz, but much excelling Topazes in transparency, brilliancy of colour, and hardness. If so, as stated when speaking of the Sapphire, it was an Alumine mineral of the genus Corundum.

If this may be accepted as correct, and if we may assume that on it the name of Gad (a Band, Gen. xxx. 11—see also his blessings, Gen. xlix. 19; Deut. xxxiii. 20, 21) was engraved, the Chrysolite pointed, perhaps, to the abiding beauty of faith in God, and in his revelations. Hence Sweden and Norway may be the Tribe corresponding to Gad: for honesty and passive courage in adhering to what they are, uninfluenced by the example of others, is their characteristic.

7. Ligure. Heb. Lehshem; Greek, Ligurion. Mentioned in Ex. xxviii. 19, xxxix. 12—but not in Rev. xxi. It is said to have been a deep-red coloured stone, with a considerable tinge of yellow: resembling the Carbuncle by possessing a brightness sparkling like fire. As the name in Greek signifies "to lick up," it is supposed to have been electric. The modern Ligurite is an apple-green mineral—not electric. The Jacinth or Hyacinth, a transparent or translucent stone of a red colour passing into orange red, has been supposed to be probably the Ligure, although it is not electric—it is a Zirconite mineral.

If this may be accepted as correct, and if we may assume that on it the name of Ephraim (Double fruitfulness, Gen. xli. 51—see also his and Joseph's blessings, Gen. xxx. 23, 24; xlviii. 15, 16, 19, 20, xlix. 22–26; Deut. xxxiii. 13–17) was engraved, the orange tint of the Ligure pointed, perhaps, to the abiding beauty of the ready obedience of faith that wins unlimited blessings from God. The only Christian Tribe left to correspond with Ephraim seems to be Poland —but it is not easy to trace a resemblance.

8. Agate. Heb. Sh'voh; Greek, Achates. Mentioned in Ex. xxviii. 19, xxxix. 12—but not in Rev. xxi. Its Hebrew name was probably derived from Sheba, whence precious stones were brought to Tyre, Ezk. xxvii. 22. Agate is com-

posed chiefly of that tough sort of Silex called Chalcedony, but with the addition of other varieties of Silex—either mixed with it or arranged in alternate layers, flat or spherical—such as amethyst, jasper, heliotrope, and opal. It is nearly allied to Carnelian, but has usually a greater variety of colours.

If this may be accepted as correct, and if we may assume that on it the name of Manasseh (Forgetting—see also his and Joseph's blessings, Gen. xli. 52, xlviii. 15, 16, 19, 20, xlix. 2–26, Deut. xxxiii. 13–17) was engraved, Agate pointed, perhaps, to the abiding beauty of social virtues—the exhibition of a fair measure of various good qualities, without any prominent characteristic. Hence Italy may correspond to Manasseh: for civic virtues, faithful citizenship, are its characteristic.

9. Amethyst. Heb. Ahlamah; Greek, Amethystos. Mentioned in Ex. xxviii. 19, xxxix. 12; Rev. xxi. 20—where it is twelfth of the series. It was said to be a transparent, purple coloured (sometimes bluish-purple, sometimes reddish-purple) gem. It may have been the same mineral as now bears that designation, namely, Rock Crystal of an amethystine colour —being pure Silex all but the colouring matter; or it may have been Sapphire of the same colour, with something more of lustre. As no doubt it was its transparency and colour that were its characteristics, it probably matters little which it may have been.

If we may accept this as correct, and if we may assume that on it the name of Benjamin (Son of the right hand, Gen. xxvi. 18—see also his blessings, Gen. xxx. 27; Deut. xxxiii. 12) was engraved, Amethyst pointed, perhaps, to the abiding beauty of the dignity of deportment that should be seen in those, however insignificant in themselves, who are embraced by the election of God. By chance, the superstitious custom of the Greeks to wear an amethyst ring to prevent the effects of wine, harmonises with this explanation. Switzerland may correspond to Benjamin: for a dignified patriotism (though a small nation inhabiting a poor country) is its characteristic.

10. Beryl. Heb. Tarsheesh; Greek, Beryllos. Mentioned

in Ex. xxviii. 20, xxxix. 13; Song v. 14; Ezk. i. 16, x. 9, xxviii. 13; Dan. x. 6; Rev. xxi. 20. It is the eleventh in the Septuagint series, and the eighth in that of Rev. xxi. It is said to have been a transparent stone of sea or bluish-green colour, as apparently implied by its Heb. name, which is continually connected with the sea. It is probably the same gem as now bears the name—the Aquamarine—being a Glucine mineral, akin to Emerald.

If this may be accepted as correct, and if we may assume that on it the name of Dan (Judge, Gen. xxx. 6—see also his blessings, Gen. xlix. 16–18; Deut. xxxiii. 22) was engraved, Beryl pointed, perhaps, to the abiding beauty of buoyant hope: bursting forth into the praising of God for his promises in the faith of their sufficiency, and in the hope of seeing them fulfilled. *I have waited for thy salvation, O Lord.* Gen. xlix. 18. Hence Russia may be the corresponding Tribe: for a persistent expectation of the fulfilment of what is supposed to be the decrees of providence is its characteristic.

11. Onyx. Heb. Shohham; Greek, Sardonyx. Mentioned, Gen. ii. 12; Ex. xxv. 7, xxviii. 9, 20, xxxv. 9, 27, xxxix. 6, 13; 1 Chr. xxix. 2; Job xxviii. 16; Ezk. xxviii. 13. It is the twelfth in the Septuagint, and does not occur in Rev. xxi. It is said to have derived its names from words signifying "pale" and "nail," which well indicate Chalcedony: it being generally of a pale waxy semi-translucent appearance, though sometimes coloured. Being tough as well as only moderately hard, it was anciently much used for engraving on. The term Onyx in modern times has been restricted to the variety of Chalcedony which consists of alternate layers of opaque white, and of feebly translucent brown; Sardonyx is that in which the alternate bands are of a rich reddish brown; while those of Heliotrope and Bloodstone have been applied to a dark green variety speckled with red; and that of Chrysoprase, to one of an apple-green colour. It is probable that the highly esteemed gem was one of the first two sorts.

If this may be accepted as correct, and if we may assume that on it the name of Asher (Happy, Gen. xxx. 13; see also his blessings, Gen. xlix. 20; Deut. xxxiii. 24, 25) was engraved, Onyx pointed, perhaps, to the abiding beauty of the union that ought to exist among brethren, so that of many bands or tribes one people may be composed. This Gem being used for the stones on the shoulders, with the names of the Tribes, six on each, seems to confirm this. Ex. xxviii. 9. Hence France may be the corresponding Tribe: for a yearning after fraternity is its characteristic.

12. Jasper. Heb. Jashpheh; Greek, Jaspis. Mentioned in Ex. xxviii. 20, xxxix. 13; Ezk. xxviii. 13; Rev. iv. 3, xxi. 11, 18, 19—where it is first in the series, while it is placed sixth in the Septuagint. It is said to have been a hard stone, of a beautiful bright-green colour; sometimes clouded or spotted with white, red, and yellow. There seems no reason to doubt that it was the mineral still called Jasper, which is closegrained, hard, opaque, capable of taking on a perfect polish, and of endless varieties of colour: though that sort having a green base may have been most highly esteemed. The expressions connected with this word in Rev. xxi. 11, are hard to understand, namely, *Her light was like unto a stone most precious, even like a jasper stone, clear as crystal.* Jasper being a silex mineral, akin to Chalcedony—like it in never being found crystallized, and distinguished from it by being perfectly opaque—it is impossible to realize a crystal-clear Jasper stone. Perhaps it means a glory as enduring or as variegated as Jasper, while being as clear as crystal. The Jasper pebbles of Egypt, which are, when cut through, of a pleasing cream colour, with concentric bands of brown, are perfectly opaque, like all other varieties.

If this may be accepted as correct, and if we may assume that on it the name of Naphtali (Immense wrestlings, Gen. xxx. 8—see also his blessings, Gen. xlix. 21; Deut. xxxiii. 23) was engraved, Jasper pointed, perhaps, to the abiding beauty of confident intercession, the prevailing to obtain gracious answers from God, even in the hardest and darkest matters, by persevering supplication: possibly like the lapidary obtaining from a rough unpromising piece of stone, by hard cutting and continuous grinding, a gem of brilliant polish and beautiful colours. Hence Spain and Portugal may correspond to Naphtali: chivalrous adherence to an adopted purpose, undisheartened by practical difficulties, being their characteristic.

A summation of the preceding remarks, if these cogitations have the germs of truth in them, would form an approximation to an intelligent illustration of the following facts. 1. That the twelve stones of the Pectoral pointed by their physical properties to twelve spiritual qualities that ought and did to some extent characterise the Patriarchs and Tribes—each stone representing that of the Patriarch and Tribe whose name was engraved on it. 2. That these qualities are or ought to be the characteristics of the Christian nations with their Leaders in spiritual things, that respectively correspond to the Jewish Patriarchs and Tribes. 3. That these qualities shall still be the strength and ornament of the perfected Church when exalted over all in the Kingdom. The stones in the last column of the Table have not been commented on, because, though they should be kept in view, and doubtless are the same, and the symbols of the same spiritual qualities as those of the first column, they refer to the Exhibition of them in the Kingdom. No practical benefit can accrue to the Church from pondering the mysteries of the future position while as yet she understands not the mystery of the stones of the Pectoral which is connected with the wilderness position in which she now stands.

In concluding this speculation about Precious Stones, a question may be asked that is worthy of consideration. Why is it that, apparently, no colourless transparent stones, probably the most striking of all, were inserted in the Pectoral? Is not this fact a confirmation of the principle assumed, that the coloured Gems used were symbols of special spiritual qualities (pointing to the beauty of these several qualities); while uncoloured Gems refracting and reflecting light undivided are symbols of the beauty of holiness as a whole? Some observations on Rock-crystal and Diamond may be added by way of illustration: the same being more or less applicable to the colourless crystals of other stones.

13. Rock-crystal. Heb. Kehrakh; Greek, Crystallos. Silica is a white earthy mineral, very common as quartz or flint, and

constituting, it is supposed, one half of the solid materials of the globe. When crystallized it is transparent: colourless, it is called Rock-crystal; coloured, it is called Amethyst, Cairngorm, &c. The word T'choxheeth, translated Crystal in Job xxviii. 17, is said to be derived from a root signifying purity; being exactly what the best specimens at once suggest as its symbolic meaning—cool purity. It is disputed by the learned, whether Rock-crystal be mentioned in the Bible or not, the word translated crystal in Ezk. i. 22, being in all other places translated, with apparent propriety, frost or ice. But it seems strange there should be no reference to the mineral which is so prominent that it may be taken as the representative of all the earthy materials of dead matter: especially as, though in its more common state it be uninteresting, it becomes beautiful and curious by crystallization; and whether colourless or coloured, was cut, engraved, and used as signets or drinking cups at an early period. The future *sea of glass* (Rev. iv. 6), and *river of life* (Rev. xxii. 1), whatever these may mean, are, for our instruction, declared to be like unto crystal: confirming very much the symbolic meaning declared, namely, the perfect purity of holiness.

14. Diamond. Heb. Jahhalohm. This is a mineral differing in many respects from Rock-crystal, though small specimens of the latter are sometimes mistaken for the former by persons not familiar with such articles. It is not an earthy but a combustible substance, it is not silicum but carbon, it is not abundant but rare; it does not occur in many conditions, but only crystallized: that is, carbon is not called Diamond when in any form save crystals. The Diamond is mentioned in A.V. among the stones of the Breastplate, Ex. xxviii. 18, xxxix. 11; and among the jewels of the king of Tyrus (Ezk. xxviii. 13), but the learned are uncertain whether the word found there is rightly translated Diamond or not. In the Septuagint the name Diamond does not appear, but, instead of it, Jasper is spoken of, a stone that neither in substance or appearance has any resemblance to it. It is difficult to believe that the Diamond was not known, or not esteemed one of the precious stones in those days. The difference, in outward appearance,

between Rock-crystal and Diamond is well distinguished in the names given to each, respectively, in the East; the former being called "purity," the latter "eye of purity;" for while Rock-crystal has a cold clearness, the Diamond has a warm, life-like clearness, owing to the quantity of sparkling light, both white and coloured, which it reflects. While, therefore, Rock-crystal is the symbol of the purity of holiness, the Diamond is that of the beauty of holiness: a difference between things similar which has been adverted to, at page 77, when speaking of Light.

III. A few common substances.

1. Adamant. Heb. Sh'meer, and Shahmeer; Greek, Adamas. This being evidently an exceedingly hard stone it must almost of necessity have been Corundum: the imperfect crystals of which (Sapphire) and the compact variety were doubtless used to cut and polish other gems. Its symbolic use is given in Scripture, namely, irresistible persistence: in a good sense, in the service of God, Ezk. iii. 9 (*harder than flint,* Heb. Khallahmeesh, which is used in the same symbolic sense, Is. l. 7); and in a bad sense, in the fulfilment of man's natural will. Jer. xvii. 1; Zec. vii. 12.

2. Sulphur or Brimstone. Heb. Gophreeth. It is a yellow substance easily inflamed, and burns slowly away, emitting a beautiful quiet-looking blue flame, but attended with a suffocating vapour. It is spoken of (the state of ignition being declared or implied) in a good many places of Scripture, either as having been, or as being to be made use of by God in the punishment of the wicked. Gen. xix. 24; Deut. xxix. 23. In Rev. ix. 17, 18, Brimstone is stated to form part of the breastplate of the mystical riders; and, in connection with fire and smoke, it is mentioned as proceeding from the lion-like mouths of the mystical horses there foreseen, shewing that it is here used as the emblem of some spiritual quality—the glory, and the weapon of attack of those used to destroy the unfaithful. Sulphur (burning) is therefore probably the symbol of wickedness, in the aspect of its deceitful seductiveness, stupifying contamination, and self-destructiveness: Satan's drawing near to men as an angel of light,

causing spiritual death to them, and ending in his own perdition.

3. Fuller's Earth, or Soap. Heb. Bohreeth, Jer. ii. 22; Mal. iii. 2. Nitre. Heb. Nehther, Prov. xxv. 20; Jer. ii. 22. The former was probably Potash, the latter Natron or Soda, which being Alkalies greedily absorb grease, and forming therewith soluble compounds, facilitate the cleansing of clothes, or of the face and hands. Such minerals are the natural symbols of repentance, whereby is made possible the cleansing of the conscience by the appointed means. The reproof by Jeremiah teaches, that the taking pains to cleanse the body will not cleanse the soul: this requiring a special course adapted to that end. And the warning of Malachi intimating that men, to be made fit for the presence of the Lord, require a scouring like that wherewith a fuller makes clean his cloth: a process proving too hard for some men to bear.

4. Salt. Heb. Mehlakh. Greek, Alas. Lev. ii. 13, &c.; Matt. v. 13, &c. The language in these two texts (out of many) is sufficient to remind one that Salt is the symbol of some important quality, and that this is resistance to change: in a good sense resistance to the corruption of the natural man (of which Leaven is an appointed symbol, Ex. xxxiv. 25; Matt. xvi. 6; 1 Cor. v. 6), which the conversation of Christian men should be free from; in an evil sense resistance to improvement. Jud. ix. 45; Zeph. ii. 9.

In reference to the opinion that the course of Creation has been followed in the course of Redemption, it falls to be considered in this place what analogy there may be between the work of the Creator on the First Day, and the work of the Redeemer during the First One-thousand-years Period of the World's history.

By way of introduction to the observations to be offered on the analogies between the works of these two periods, it may be suggested here, in addition to what was said at page 43, that the brooding of the Spirit over Chaos before the morning of the First Day, may perhaps have its counterpart in that work which doubtless He performed in the soul of Adam (bewildered into stupefaction by the insupportable suspense respecting the issue of his act of disobedience) during the period that elapsed—the length of which is unknown—from the eating of the forbidden fruit to the announcement of God's purpose of salvation. The knowledge of the horror of great darkness of the condition of sin to which Adam had attained, contrasted with the experience which he had had of the cheerful pleasantness of a state of innocency, may have aided the gentle influences of the Spirit's movements on his conscience, and made him able to endure the high inquisition God held as to the facts of the case, and to bow with some measure of obedience to the sentence pronounced: so hard to bear, though so much lighter than his rebellion merited. The Scripture notes of this period of spiritual darkness are:—

—*They knew that they were naked, &c.*
—*They heard the voice of the Lord, &c.*
—*Adam and his wife hid themselves, &c.*
—*Adam, where art thou? &c.*
—*I was afraid, because I was naked, &c.*
—*Hast thou eaten of the tree? &c.*
—*The woman whom thou gavest to be with me, &c.*
—*The Lord God said to the woman, &c.*
—*The woman said, the serpent beguiled me, &c.*
—*The Lord God said unto the serpent, because thou hast done this, thou are cursed, &c.*

An analysis of the First Day's work, made to facilitate the detection of any analogies, may be thus stated. When the Creator would change dark cold Chaos into a world full of life and beauty, his first work was to create Light.

—*God said, Let there be light.*
—*God saw the light that it was good.*
—*God divided* [made plain the contrast] *the light from the darkness.*
—*God called the light Day, and the darkness he called Night.*

When the Redeemer would begin his work, his first acts towards uplifting Man into a state of righteousness, and restoring him to the service of God, were making plain the need of and revealing a purpose of mercy, with an exhibition of its mode of accomplishment being through sacrifice and obedience.

—*I will put enmity between thy seed and her seed.*

—*It shall bruise thy head, and thou shall bruise his heel.*

—*Unto the woman he said . . . in sorrow shalt thou bring forth children, &c.*

—*Unto the man he said . . . in the sweat of thy face shalt thou eat bread, &c.*

—*Unto Adam also and to his wife did the Lord God make coats of skins, and clothed them.*

—*Therefore the Lord God sent him forth from the garden of Eden, to till the ground from whence he was taken.*

—*He placed at the east of the garden of Eden Cherubims . . . to keep the way of the tree of life.*

—*And Cain went out from the presence of the Lord.* Cain, Lamech, Jabal, Tubal, and Tubal-cain. Gen. iv. 16–24.

—*Book of the generations of Adam.* Adam, Seth, Enoch. Gen. v. 1–24.

—*Enoch walked with God, and he was not, for God took him.* Gen. v. 24.

Now the question is, Are there any analogies between these two series of facts?

At morn the Word of God said *Let there be light and there was light*, so that if any man of physical intelligence had been there he could have seen what Chaos was like, and the changes thereon that immediately began to take place. The Light comprising, according to the conclusion come to on a previous page, all the physical forces that should be necessary for accomplishing in perpetuity all the changes in the state of matter that should be requisite according to the purpose of God; and they all began to operate on the First Day, so that the Creator could from experience before evening see that it was good. Did the declaration, *It shall bruise thy head*, with its concomitant sentences and acts, constitute such a revelation of God's purpose of redemption as to comprise, virtually, a proclamation of the appointment of all the spiritual operations that should be requisite for effecting the same, and this made in the hearing of, and for the encouragement of Manhood, at that time headed up in and represented by Adam. If any man of spiritual intelligence had been there could he have discovered by this declaration the forlorn condition of Manhood then existing, and the glorious hope set before it? If so, we may infer that there is probably an analogy between the two cases.

Towards the evening of the First Day, *God saw the light that it was good.* Towards the end of the First Period, had God had such experience of the plan of redemption He had ordained, though the light of the hope thereof as yet shone but as the slender ray of a star twinkling between the black clouds of a dark night, that He could judge of it and approve of it as worthy to shine brighter and brighter unto the perfect day; and did he give any expression to such approval? Apparently God did then as in the succeeding dispensations (Ro. xi. 4, 5) prevail to obtain for Himself a righteous seed walking in his fear according to the measure of the light of his will vouchsafed to them, and therefore had the proof before Him that the Gospel of Salvation even in its first feeble accents was a word of power accomplishing that whereunto it was sent; and possibly the declaration of this was the object of the translation of Enoch, for before it, *he had this testimony that he pleased God.* Heb. xi. 4. If so, the supposed spectator, of spiritual intelligence, might have discerned all this, and about the year 1000 have exclaimed—The light of salvation sufficeth! It is good!

And God divided the light from the darkness. And God called the light Day, and the darkness he called Night. That is, He not only separated them but marked their distinction by names. Did it correspond with this that the sense of the need, and the hope of salvation in the heart of Adam, Seth, Enoch, and others, who feared God and desired to obey Him, caused them to be a markedly different sort of people in life and conversation from those others who felt not the need, and therefore cherished not the hope; and thus caused the former to be stamped with the title of sons of God, and the latter with the name of the sons of men: these distinctive designations being evidently applicable, whether in use or not, long before the period when first recorded in Scripture. If so, there seems to be another analogy respecting this period.

The sum of which remarks is this.

1. As in the dark position of Chaos God brought forth

light that endures to this day—yet without destroying the darkness: so in the dark position of Manhood He brought forth spiritual light that He has caused to continue to this day—shining brighter and brighter—in those whom then and since He has prevailed to obtain as witnesses for Himself; and has not yet destroyed him who is the author of spiritual darkness, or those who love his companionship.

2. As God judged and approved of the physical light; so He pronounced favourable judgment on the spiritual light in those whom He prevailed to enlighten, by translating Enoch: the language of whose prophecy intimates that he was not singular in holiness even at that early period. Jude ver. 14.

3. As God divided the light from the darkness, and fixed them in permanent separation by distinguishing them by names; so He permitted the spiritual darkness originated by the Fall to continue in Cain and his apostate descendants: their history kept distinct in Gen. iv., from that of Seth and his descendants in Gen. v.; they of the earth earthy, and excelling in earthly things—the men in manual labour the women in bodily beauty. The light begun by God's conversing with Adam, and by his communion with those afterwards who walked with Him, led Seth's descendants to more excellence in higher things. The former known to be merely sons of men, children of darkness through refusing the proffered light, the latter known as sons of God (holy ones of God, as Enoch the seventh from Adam called them), children of the light, because they accepted the light which God had given.